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The Transactions of the Medico-Chirurgical Society of Edinburgh

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The Transactions
of the
Medico-Chirurgical Society of Edinburgh

Session 1919-1920

VOL. XXXIV.—NEW SERIES

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1921

PREFACE

THE present Volume is the thirty-fourth of the New Series, and contains a record of the work done during the past Session. The last Volume which appeared gave a record of the work done during the year 1913-1914, the Meetings of the Society having been in abeyance for five years during the period of the War. Numerous changes have fallen to be made in the lists of Foreign Corresponding Members and Corresponding Members in the United Kingdom, many deaths having occurred in these lists in the past six years.

The work, as hitherto, embraces the communication of Original Papers; the exhibition of Patients, illustrating rare and interesting forms of disease; and the exhibition of Pathological and other Specimens, so essential to the proper understanding of the morbid changes which take place in the human body.

Ten Meetings were held in the year, two of them being Clinical Meetings. The latest Meetings of the Society during the year were held in the New Gallery, Shandwick Place.

CHALMERS WATSON,
Editor.

November 1920.

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Instituted 2nd August 1821

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TRANSACTIONS

OF THE

MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH

FOR SESSION XCIX., 1919-1920

Meeting I.—November 5, 1919

Dr JOHN PLAYFAIR, *President, in the Chair*

I. ELECTION OF OFFICE-BEARERS

The following gentlemen were elected office-bearers:—*President*, Professor F. M. Caird, C.M.G.; *Vice-Presidents*, Professor Russell, Sir J. Hodsdon, Dr Edward Carmichael; *Council*, Sir Montagu Cotterill, C.M.G., Dr Armour, Dr Stewart Fowler, Dr John Playfair, Mr Scot Skirving, Dr Torrance Thomson, Dr W. T. Ritchie, Dr D. J. Graham; *Treasurer*, Dr Macrae Taylor; *Secretaries*, Dr Edwin Bramwell, Mr George L. Chiene; *Editor of Transactions*, Dr Chalmers Watson.

II. Treasurer's Annual Statement

EDINBURGH MEDICO-CHIRURGICAL SOCIETY

Balance Sheet, 1st November 1915 to 31st October 1919

Ordinary Revenue—					**Ordinary Expenditure—**				
Subscriptions					1915-16.				
					Neill & Co. . .	£1	8	0	
Extraordinary Revenue—					Caretaker's Fee	0	5	0	
Dividends from Caledonian Railway Stock, *less* Income Tax—								£1	13 0
1915-16 . .	£11	14	3		1916-17. ——				
1916-17 . . .	10	10	0		1917-18. ——				
1917-18 . . .	10	8	6		1918-19.				
1918-19 . . .	9	16	0		Neill & Co. . .	£6	10	6	
			£42	8 9	Macvitties, Guest & Co. . . .	4	0	0	
Dividends from Dominion of Canada Stock, *less* Income Tax—								10	10 6
1915-16 . . .	£8	5	5		**Extraordinary Expenditure—**				
1916-17 . . .	7	13	6		1918-19. Repayment of Loans to Members . .	£30	0	0	
1917-18 . . .	7	12	3					30	0 0
1918-19 . . .	7	7	0		**Funds at 31st October 1919—**				
			30	18 2	£350 Caledonian Railway 4% Debenture Stock, at cost price	£484	11	6	
Bank Interest. . . .			3	0 8	£300 Dominion of Canada 3½% Debenture Stock, at cost price	298	2	6	
Funds at 31st October 1915—								782	14 0
£350 Caledonian Railway 4% Debenture Stock, at cost price	£484	11	6		Cash in Deposit Receipt with National Bank of Scotland .	£26	16	9	
£300 Dominion of Canada 3½% Debenture Stock, at cost price	298	2	6		Cash in Current Account with National Bank of Scotland .	19	8	2	
			782	14 0				46	4 11
Cash in Current Account .			12	0 10				£871	2 5
			£871	2 5					

We have this day audited the above accounts and find them correct and sufficiently vouched.

J. W. DOWDEN.
HARRY RAINY.

28th November 1919.

III. Valedictory Address

By the President, Dr John Playfair

Gentlemen,—As your retiring President, I believe I stand in the unique position of having filled the Presidential Chair for six years. This lengthened period of office I owe not to any merits of my own, but to the national upheaval caused by the greatest and most destructive war the world has ever experienced, and which time and again threatened the very existence of the life of our own nation. During the five years the war raged the one all-important subject—our national safety—needed all our energies and occupied all our thoughts.

Germany declared war soon after our last Summer Meeting in 1914, and from that time till the Armistice was declared in November 1918 the titanic struggle went on. Our nation responded nobly to the gigantic calls made on its manhood and material resources, and though stricken and at great sacrifice, at last emerged victorious from the awful and devastating struggle. Could it be wondered at that our Society practically ceased its work and activities after that last Summer Meeting in July 1914 till the suspension of hostilities in November 1918? One or two almost purely business meetings certainly did take place, at which it was resolved that the present officials of the Society should continue to hold office till more peaceful and happier times returned; and hence it is that my occupancy of the Presidential Chair has been so prolonged.

After you did me the honour to elect me President at the first meeting of the session 1913-1914, a few ordinary meetings of the Society were held, at which excellent and instructive papers were read and discussed. There were ten of those meetings, occupying a complete winter and summer session. Unfortunately I was absent from three of the meetings. A tempting offer of a visit to India, during the winter and early spring of 1913-1914, had come my way, and knowing that my duties in the Chair would be amply and efficiently discharged by the Vice-Presidents, I accepted.

At the first meeting of the winter session of the Society in 1913, Dr Ninian Bruce read his able and illuminating paper on "The Suprarenal Glands."

The next was a clinical meeting at the Royal Infirmary, at which many and instructive cases were shown and described.

The third meeting was occupied by a discussion on "Isolation and Quarantine Periods in the more common Infectious Diseases," opened by Dr Claude Ker and taken part in by many of the attending members.

At the fourth meeting two papers were read—one of much interest by Mr James M. Graham on "Further Observations on Primary Carcinoma of the Appendix"; the other an elaborate and suggestive paper by Dr Chalmers Watson on "The Manifestations and Treatment of Intestinal Toxæmia."

The next, the fifth meeting, has a mournful and tragic interest for the Society, in so far that two of the members who took a prominent part in the proceedings are no longer with us, both having died on active service. Our much missed and much mourned Vice-President, Dr Melville Dunlop, occupied the Presidential Chair that evening, and the late Dr Edmund Price read a concise and helpful paper on "The Röntgen Ray and Bismuth as an Aid in the Diagnosis of some Alimentary Diseases." At the same meeting Dr Byrom Bramwell read his paper on "Diffuse Sclerodermia," the subject being treated by Dr Bramwell in his usual clear and exhaustive manner.

At the sixth meeting Dr J. S. Fraser read a paper on "Labyrinth Suppuration," an able exposition of a difficult subject, and Dr Dawson Turner followed with a note on a case of "Squamous Epithelioma treated by Radium."

The seventh meeting was occupied by two papers—one, a valuable and interesting communication on "Empyema in Children" from our late Vice-President, Dr Melville Dunlop; and the other on "The Pathology and Etiology of Duodenal Ulcer" by Mr D. P. D. Wilkie. The subject was ably treated by Mr Wilkie and roused much interest in the Society.

The eighth was a clinical meeting at the Royal Infirmary.

At the ninth meeting Dr Chalmers Watson showed some beautiful X-ray photographs, and a paper on a very interesting but rather intricate subject—"Jackson's Membrane and the Genito-Mesenteric Fold of Peritoneum"—was read by Dr R. S. Reid of Cambridge. At the same meeting Dr Torrance Thomson showed and described an ingenious apparatus for the Intratracheal Insufflation of Ether.

Our last meeting before the war—that on 1st July 1914—was devoted to receiving reports from Committees appointed by the Society on, first, "Isolation and other matters in connection with the more common Infective Diseases," and second, and of great importance, a report on "The Edinburgh Milk Supply," a careful, thorough, and elaborate inquiry into the subject, and concluding with valuable and most necessary recommendations for the improvement of the quality of milk supplied to the city.

Thereafter we had only one or two meetings, chiefly for the transaction of formal and necessary business, till the 14th of May 1919, when the Society awoke from its state of suspended animation and resumed its regular meetings. The first was devoted to a discussion on Influenza, the subject being suggested by the severe and deadly epidemic which occurred last winter and spring. The meeting was largely attended, and an animated discussion ensued after an able opening speech by Dr W. Russell. Many members spoke, and much interesting information resulted.

Again on the 4th of June of this year we had a clinical meeting at the Royal Infirmary, the cases shown and described being of much interest and educative value.

The mere enumeration of these papers and discussions shows, I think, that the Society had lost none of its vigour and vitality; and I venture to say that it would have had much more original and valuable work to its credit, had not the European conflagration broken out and paralysed the thought and initiative of the nation except that evoked for its self-defence and preservation.

With that short and, I am afraid, very imperfect account of the doings of the Society since the meeting on 5th November 1913, when I began my term of office as President, I now pass to notice the blanks which have been made in our ranks—a sorrowful and touching duty, but one which we owe to the memory of those whose loss we shall always feel and deplore. Of its honorary members the Society has lost all but one. Professor Kocher of Berne, Dr John S. Billings of New York, Sir Thomas Lauder Brunton, Principal Sir William Turner, Professor Ehrlich of Frankfort-on-Maine, and Professor Metchnikoff of the Pasteur Institute, Paris, have all gone, Sir William Osler being the only survivor of our honorary

members. Our deceased honorary members were all outstanding men of world-wide reputation, and I feel that nothing that I could say could enhance the respect and esteem we all had for them.

I cannot, however, pass over the name of Sir William Turner without some expression of our feelings towards him. The best of teachers and wisest of counsellors, we felt we had in him one to whom we could always turn for advice and help in time of uncertainty and difficulty, and no applicant, I am very sure, ever left him disappointed or discouraged. Besides his scientific and professional attainments Sir William had a knowledge of men and affairs possessed by few, and that, combined with strong good sense and a well-balanced judgment, made him nothing but a power for good amongst us, while his kindly, courteous manner and strong sense of humour increased our regard and affection for him. His loss has left a blank amongst us which cannot be filled.

Death has also dealt heavily with our ordinary members during the period of the war. To the best of my knowledge, twenty-seven have been taken from us. Time and space will not admit of anything like an obituary notice of each, though much could be said in eulogistic memory of each and all of them. All of you knew them—some of them you probably reckoned amongst your closest and dearest friends. Any tribute I could therefore pay to their memory from this Chair would probably be superfluous, and is unnecessary. There are one or two, however, about whom I feel I must say a few words, if it is only to remind the Society what grievous loss we have sustained since the war broke in upon the peaceful life of the nation. First I would mention our two past Presidents, Sir Alexander R. Simpson and Sir T. S. Clouston. The former, wonderfully young and active for his years, tragically met his death by accident when as yet his bodily and mental vigour were little impaired. A man of much erudition and with exalted Christian and philanthropic ideals, he held a high place in the estimation not only of the profession to which he belonged but also of the whole community. Sir Thomas Clouston, our other past President whose loss we have to deplore, had also settled down amongst us to a well-earned retirement, but with powers little, if any, abated and as keenly

interested as ever in professional and general affairs. Highly distinguished in his special department of medicine, we miss his vigorous, alert presence and his willing help and advice in mental cases—often difficult and a source of anxiety to the general practitioner.

The other members of the Society who are no longer with us have all claims on our respect and esteem, but I know you will not misunderstand my feeling towards them if I restrict myself to the mention of those who have died on active or home military service. And first let me speak of our Vice-President, Dr Melville Dunlop, or as he was best known to most of us as Harry Dunlop. Though over the military age his ardent and enthusiastic temperament made him unable to resist his country's need and call, and he died at his post in France, taking his full share in the work and management of the military hospital to which he was attached, a victim to the devastating epidemic of influenzal pneumonia which swept over the whole world at that time. A man of charming personality and great ability, our Society, and indeed our whole profession, is much the poorer for his loss. We can never forget his erect, active, handsome figure, and his ever ready, kindly, generous greeting.

The others who died on active service abroad were Dr Aitken Ross, Dr W. Guthrie Porter, and Mr Dennis Cotterill.

Mr Dennis Cotterill we all knew as a most promising young surgeon and delightful colleague and friend. The sympathy of the Society, I am sure, goes earnestly and sincerely out to his father, Sir Joseph Cotterill, in the bereavement he has sustained by the death of such a gallant and estimable son; and Sir Joseph has also had an added sorrow and misfortune by the death of his son-in-law, Dr W. Guthrie Porter.

Dr Porter's devotion to his country claims our highest admiration. While he was absolutely entitled to follow the safer military duty of surgeon, he bravely chose combatant service, and was killed in action. While we cannot but admire his high courage and sense of duty, we must all feel that the nation could ill spare a man of such promise and standing in the special branch of his profession which he so successfully practised.

Dr Aitken Ross belonged to the Territorial Force, in which he held the rank of Lieutenant-Colonel. He accompanied the

Third Lowland Brigade to Gallipoli, where the exposure and severity of the service injured his heart. He was invalided home for heart strain and died in London in 1915. A good type of the resourceful and practical general practitioner, he is missed and mourned by a large circle of sorrowing friends and devoted patients.

Two more of our members died while on home military service—Dr Russell Wood and Dr Edmund Price. Both died suddenly of heart failure, due probably to their having undertaken duties in defence of their country for which they were physically unfit. Russell Wood's death was to me, and I daresay to some others of the Society, a real personal loss. Though to those who did not know him intimately he may have appeared at times rather reticent and distant, he was one of the most genial and lovable of men, and a firm and enduring friend. From the beginning of the war he had a keen desire to give all the help he could in the nation's extremity, and though even then he had marked symptoms of the cardiac affection to which he ultimately succumbed, he accepted the Commission offered him, and as already stated, died quite suddenly and apparently without pain or struggle in the active discharge of his military duties, and to the great regret and grief of his many friends, as well as of his brother officers and men of his regiment.

Dr Price, in his desire to do something outside his professional duties on behalf of his country, joined the Volunteer Force of the city. The strain of drilling and marching was evidently too much for a weakened heart, and he collapsed and died while engaged one evening in the ordinary evolutions and exercises of Company drill. Dr Price attained great skill and proficiency in radiographic work, and his aid in the diagnosis of difficult and doubtful cases was often asked for by both physicians and surgeons, his professional knowledge being much enhanced by his courteous manner and obliging disposition.

I would only add with regard to the other deceased members of the Society that not a few of them, overworked and overanxious from the great additional strain thrown upon them by the absence of so many of their fellow-practitioners on military service, gave their lives in defence of their country as truly as those who fell in the front line of battle.

In conclusion, I wish to express my sincere and heart-felt

thanks for the high honour that has been done me in electing me President of the Edinburgh Medico-Chirurgical Society, and how conscious I am of the little I have done to merit the honour. That feeling makes me all the more grateful for the willing support and kindly aid I have received in the discharge of my duties equally from the Council and every member of the Society, and for which I would now tender my warmest thanks. I feel specially indebted to our indefatigable Secretary, Dr Edwin Bramwell, who in the absence of the co-Secretary and Treasurer on war-service has practically borne the whole burden of the management of the business and meetings during the prolonged period of my Presidentship. And, let me add, it is a great pleasure and satisfaction to me to know that I am to be succeeded by such an energetic and distinguished member as Professor Caird. Under his fostering care and able direction the Society will at once retain its former active life and vigour, and will, I feel confident, not only equal but will surpass its best efforts of the past.

IV. Original Communications

1. CARCINOMA OF THE UPPER PART OF THE ALIMENTARY CANAL, NOTE ON THE SEX AND AGE INCIDENCE OF

By ARTHUR LOGAN TURNER, M.D., F.R.C.S. Ed., Surgeon to the Ear and Throat Department, Royal Infirmary, Edinburgh.

Dr A. Logan Turner gave a brief note upon the sex and age incidence of Carcinoma occurring in the laryngeal portion of the pharynx and the upper end of the œsophagus, illustrating his remarks by the aid of the lantern.

The figures which he quoted were based upon statistics furnished by his cases in the Ear and Throat Department during the period 1907-1919.

In a total comprising 140 patients, the following parts of the gullet were affected:—

Site.	Total Cases.	Males.	Females.
Post-cricoid area . .	98	13 (13%)	85 (86%)
Œsophagus (cervical) .	19	11 (57%)	8 (42%)
„ (aorta trachea)	9	6 (66%)	3 (33%)
„ (lower end) .	14	13 (92%)	1 (7%)

The tumour, when situated in the lowest part of the pharynx, occurred much more frequently amongst women, whereas Carcinoma in the œsophagus itself was found more frequently in men.

Carcinoma of the tongue, fauces, oral pharynx, larynx and stomach, on the other hand, affected the male sex to a much greater extent than the female sex. The laryngeal statistics may be quoted:—

Larynx, 69 cases—males 59 or 85 per cent.; females, 10 or 14 per cent.

When the tumour involves the laryngeal portion of the pharynx in women, it does so at an earlier age in the female sex than in the male. This is evident from a study of the following table:—

CASES 98.

Decades.	Males.	Females.
21-30	0	6
31-40	2	27
41-50	1	20
51-60	5	26
61-70	4	4
71-80	1	2

Of the eighty-five females affected, fifty-three were under fifty years of age.

In many of the women there is a long history of difficulty in swallowing, sometimes extending over several years. The greater part of this period precedes the development of the tumour, and in all probability the obstruction is due to a spasm at the upper end of the œsophagus.

A routine examination, with the œsophagus cope, should be made in all cases complaining of obstruction before any opinion is expressed as to the probable nature of the affection.

2. PELLAGRA

By Professor F. D. BOYD, C.B., C.M.G.

Pellagra is a disease which is of enormous importance from an economic standpoint to Italy, Spain, the Middle East, Lower Egypt, Northern China, and other parts of the world. It is estimated that in Roumania alone as many as 100,000 cases of

Pellagra have occurred in one year. It is because one is convinced that there are far more cases in Great Britain than is generally recognised that one ventures to bring the subject before the Society.

When acting as Consulting Physician for the Egyptian Expeditionary Force I was associated with Lt.-Col. Lelean, R.A.M.C., in an inquiry into the health of the Turkish prisoners of war. We were fortunate in having a strong team of collaborators—Dr Wilson, Professor of Physiology in the University of Cairo, Major Ferguson, Professor of Pathology, Captain Roaf (Bio-Chemistry), Dr Woodcock (Proto-zoology), Captain Campbell, Captain Paton (Pathology and Bacteriology).

We found that Pellagra was very prevalent amongst the Turkish prisoners—in November 1918 over 1500 cases being admitted to hospital in the month.

The characteristic early clinical features of the disease are pigmentation and dryness of the skin. The pigmentation and dryness were first noticeable on the backs of the hands and on the face. On the face, commencing on the nose, it spread out over the cheek in a batwing-like outline. There was a band of pigmentation round the neck and extending down the sternum like a cravat. The dorsum of the feet showed pigmentation and dryness. Any points of pressure, as where a belt or garter had been worn, showed pigmentation, and any scars were deeply pigmented. In the acute cases the pigmentation passed to erythema, and even to ulceration. The back of the hands would appear raw and deep cracks developed.

Digestive disturbance was a prominent feature. There was complaint, as a rule, of burning and discomfort after food. The tongue was characteristic. At first somewhat furred, it rapidly lost the epithelium and had the appearance of moist, raw meat. Early in the disease the hydrochloric acid of the stomach was diminished, to become completely lost in the fully developed clinical picture. Diarrhœa was constant. The stools were markedly offensive. A total of 220 stools of pellagrous cases were examined. They contained flagellates in enormous numbers; *B. Dysenteriæ and Entamœba histolytica.* Helminthic infection was exceedingly prevalent, but careful bacteriological study revealed no micro-organisms which could be held as definite causal factors of the disease.

As was natural, nutrition suffered early in the disease. At first when there was very mild pigmentation of the hands and the face the individual could be classified as a "strong man," but after three weeks it would be noted that nutrition had begun to suffer—first noticeable, apparently, in the muscles of the upper arm and shoulder-girdle.

In no case of uncomplicated pellagra was there any fever present.

Observations of the blood-pressure were of interest. The normal Turkish prisoner of war on camp diet showed a systolic pressure of 125. Very early in the disease a fall of blood-pressure took place. Those with slight pigmentation but still graded as "strong men" gave a blood-pressure of 119. When the disease could be definitely diagnosed the blood-pressure was found to fall, on an average, to ninety-two. In acute cases it might be found as low as seventy-eight, and it was noticeable that the fall in blood-pressure was in no way proportionate to the loss in nutrition.

Nervous phenomena were a prominent feature of the fully developed disease. On entering a ward or camp, with a little experience you could recognise a pellagrous patient by his depressed and dejected appearance. Cerebration became very slow. The individual took no interest in his surroundings. At first the deep reflexes were diminished, later on in the disease exaggerated, to be finally lost when muscle tonus became finally depressed. In no case was there any interference with sensory functions. Common sensation, sensation of heat and cold, vibration sensation, all were maintained, thus, apparently, excluding beri-beri as a possible diagnosis.

A glance at Diagram 1 will show that the principal seat of the outbreak was the Labour Camp at Kantara. Was there anything in the Labour Camp which is to be considered an *ætiological* factor in the disease? Sanitation was as perfect as is compatible with camp life. Sanitary defects can thus be put out of court. The water supply was examined and found to compare favourably in content of micro-organisms with the water supply of many home districts. The water was examined for colloidal aluminium and colloidal silicon. None was found.

A map of the camp was drawn up, of the case incidence in

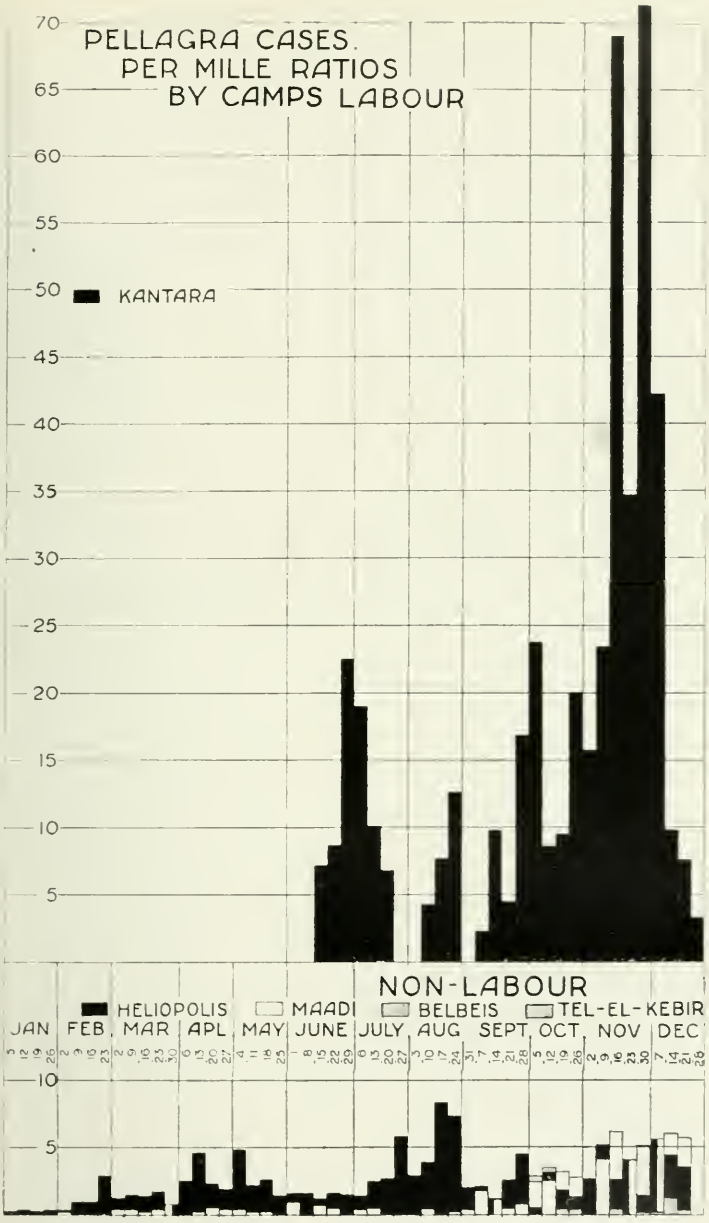

FIG. 1.

[*Face page* 12.

different tents, to consider the possibility of case-to-case infection, but the mathematical result showed that there was absolutely no evidence of such infection.

Metabolic observations were carried out on a large scale. It was found that in the pellagrous there was a considerable loss of protein by the bowel. This was accounted for (1) by loss of appetite, (2) by deficient secretion of hydrochloric acid. Deficient secretion of hydrochloric acid is followed inevitably by deficient pancreatic secretion. There is thus deficient assimilation of protein. Deficient secretion of hydrochloric acid permits of the invasion of the bowel by micro-organisms, under whose influence the protein of the food is destroyed by putrefactive decomposition. In addition to this there was loss of protein by diarrhœa.

The destructive effect of micro-organisms on the food is well seen by the work of Captain Roaf, which showed that as the clinical picture developed the proportion of indican in the urine rose, to diminish again as the attack subsided.

A very large number of observations were carried out on the blood, urine, and cerebro-spinal fluid. No specific micro-

Loss of Protein and Fat by the Bowel.

	Anticipated Loss.	Pre-pellagrous.	Pellagrous.
	Per cent.	Per cent.	Per cent.
Protein .	23	33	35
Fat . .	10	19	28

organisms, no protozoa, no spirochætes or ultra-microscopic organisms could be found after the most elaborate search. The blood showed a chlorotic type of anæmia. In none of the cases, except where there was a secondary infection such as malaria, was there any increase in the large mono-nuclear cells of the blood—a point of some importance when considering the possibility of a protozoan infection being accountable for the disease.

Metabolic observations were carried out on the apparently healthy prisoners, who were specially selected on account of their good physique and apparent absence of any pellagrous phenomena; and it is interesting to note that these individuals

were apparently in a pre-pellagrous stage, for there was a very definite actual loss of protein and fat by the bowel far in excess of what was to be anticipated.

So far, then, the inquiry had led to no definite conclusion as to why these Turkish prisoners had become pellagrous. It was only when the condition was examined from the point of view of a deficiency disease that some light seemed to be thrown upon the outbreak.

It was formerly the habit to consider dietetic values in calories—now we know that the protein of diet is only of value in the building up and repair of the body in so far as it contains certain essential amino-acids. The richness of the protein in

Protein Source.	Smallest amount protecting a man of 70 kilos from Loss of Body Protein.	Biological Value.
Meat . . .	30 grams a day	1·000
Milk . . .	31 „ „	0·965
Rice . . .	34 „ „	0·880
Beans . . .	50 „ „	0·600
Bread . . .	76 „ „	0·395
Maize . . .	102 „ „	0·293

these essential amino-acids can be calculated, and we speak then of the biological value of protein.

The table shows the smallest amount of protein which is necessary to protect a man of 70 kilos from a loss of body protein.

From the table it will be seen how low the biological value of maize stands.

Fig. 2 was drawn up for the comparison of a large number of diets bearing on a possible occurrence of pellagra under varying conditions. The table shows the total caloric value of the diet, the amount of protein, fat, and carbohydrate constituents of the diet, and, in addition, the biological value of the protein. The solid ends of the columns indicate the occurrence of pellagra.

The table indicates, *firstly*, that the total caloric value of the diet bears no relation to the occurrence of pellagra. Diets 3, 4, 5, 13, 20, 21.

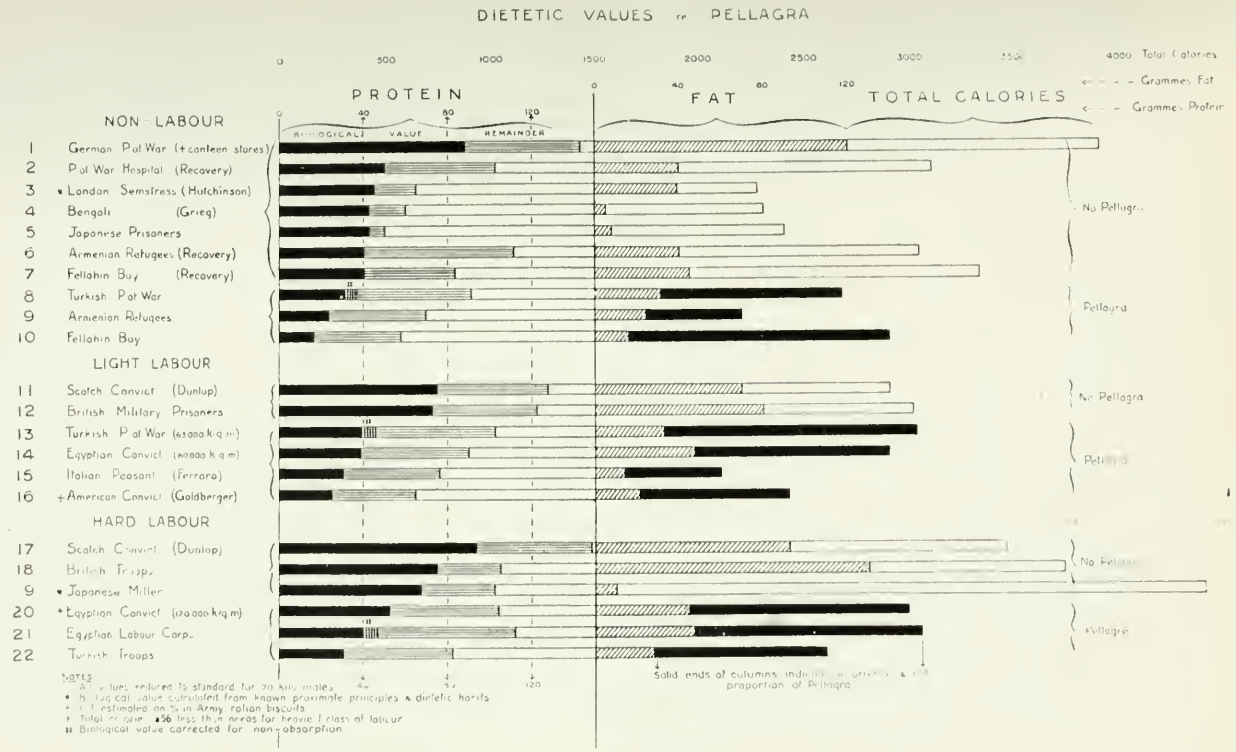

FIG. 2.

[Face page 14.

Secondly, that there is no relation between fat deficiency and the occurrence of pellagra. Diets 4, 5, 14, 19, 20, 21.

Thirdly, that the amount of total protein does not bear any relation to the occurrence of pellagra. The total protein may be small in amount and no pellagra may occur, and again pellagra may occur when the total protein is present in average quantity. Diets 3, 4, 5, 13, 20, 21.

Fourthly, the table seems to show that pellagra occurs whenever the biological protein of the diet falls below 40 grams.

The Turkish prisoners had been in a condition of semi-starvation before capture. A large proportion of them were in a pre-pellagrous or pellagrous stage when captured. They were losing protein by the bowel, by non-absorption, and by bacterial decomposition. As the diagram shows, if consideration be given to the protein loss, the diet of the Turkish prisoner was ample and generous as considered by caloric values, yet, in its content of biological protein, falls just below the standard. Add to that the element of labour, and you seem to arrive at the explanation of how the outbreak of pellagra was so prevalent in the Labour Camp as compared with the mere detention camps at other places.

Diagram 3 is of some interest. It may be remembered that in 1915 a number of Armenians who had put up a fight and taken to the hills with their families, were rescued by some French warships. They were taken to Port Said and housed in a camp. Their diet was arranged on the supposition that the men would work and supplement their diet from their earnings. Work, however, did not seem to attract the refugees, and they subsisted on a diet which was poor in biological protein. After six months of this diet, pellagra made its appearance and rapidly increased. In July the men were induced to work, and with their wages were able to supplement the diet, and pellagra slightly diminished. From September to October the incidence of pellagra was fairly constant. In October the authorities further supplemented the diet, and it will be noted that pellagra rapidly diminished, to disappear entirely when the biological value of the protein of the diet was further increased.

Dietetic experiments were carried out on an extensive scale

in hospital. Control cases were placed on an ordinary diet, and it was found that the average gain in weight over the period was 1 lb. A second series of cases were placed on ordinary diet plus extra fat in the shape of butter. These cases gained on an average 2·2 lb. in the period. A further series of cases were placed on ordinary diet plus increased vegetable protein in the shape of beans, and gained on an average over the period 7 lb. in weight.

From these observations it seems justifiable to conclude that there is a definite relation between the biological protein of the diet and the occurrence of pellagra.

Working on the lines of biological protein, in November a recommendation was made suggesting the increase of the biological protein in the diet of the prisoners of war and the stopping of work in the camp at Kantara. These recommendations, as will be seen from Diagram 1, were rapidly followed by a fall in the case incidence, so that by the end of December the admissions from the Kantara Camp had fallen to 2·5 per mille.

The morbid anatomy of the disease was unsatisfactory. A large number of post-mortem examinations were carried through, but in every case the morbid phenomena were obscured by intercurrent infection. In a series of 100 deaths there were only two which were unexpected and in which the writer was not able to determine that the individual was dying from an intercurrent infection such as Dysentery, Malaria, Relapsing fever, etc. This intercurrent infection naturally obscured and confused the morbid findings due to pellagra.

In conclusion one would urge (1) that the clinical features of the disease are those of a profound suprarenal inadequacy; (2) that there is no evidence from the clinical and pathological findings of any specific protozoan or bacterial infection; (3) that digestive disturbance accompanied by defective secretion of hydrochloric acid leads to disturbance of pancreatic functions, defective digestion, and mal-assimilation of protein and fat; (4) that there appears to be an intimate connection between the proportion of biological protein in the diet and pellagra. The relation between maize and pellagra appears to be due not to any toxic properties inherent in maize, but to the poverty of maize in biological protein. (5) The disease produces a loss

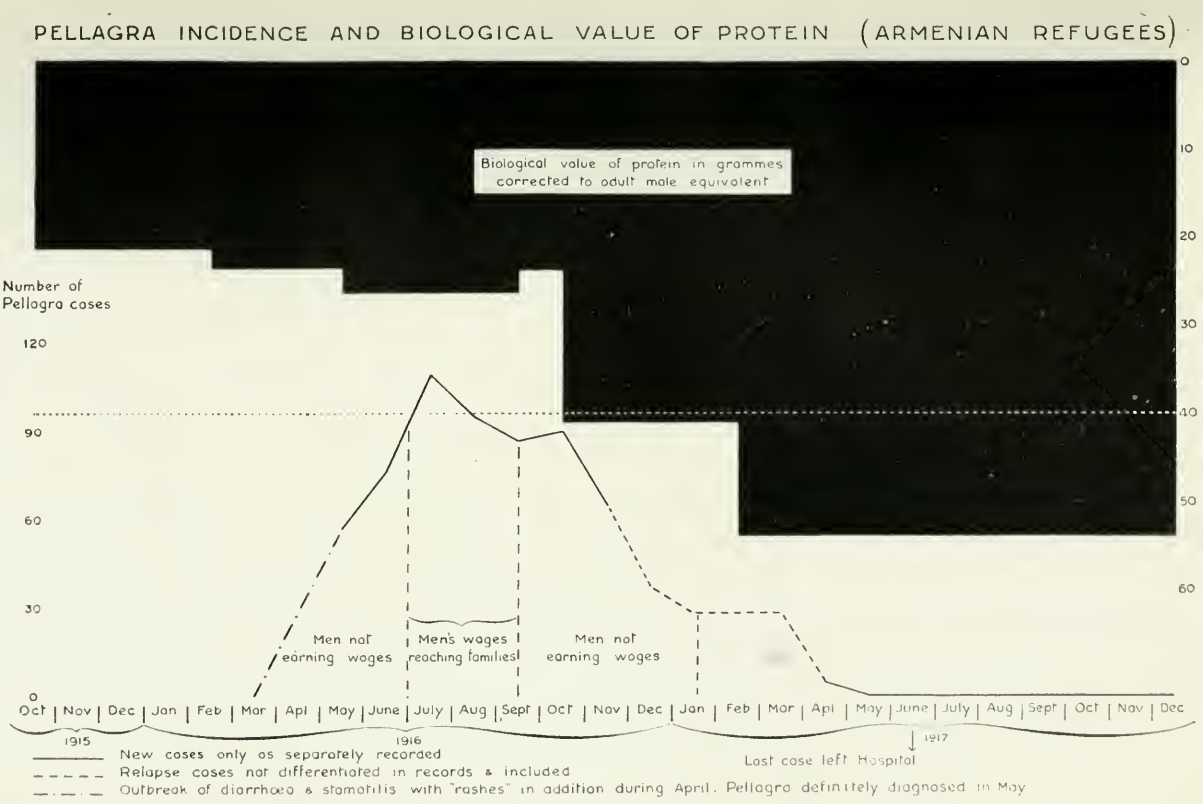
PELLAGRA INCIDENCE AND BIOLOGICAL VALUE OF PROTEIN (ARMENIAN REFUGEES)
Biological value of protein in grammes corrected to adult male equivalent
Number of Pellagra cases
120
90
60
30
0
0
10
20
30
40
50
60
Men not earning wages
Men's wages reaching families
Men not earning wages
Oct | Nov | Dec | Jan | Feb | Mar | Apl | May | June | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apl | May | June | July | Aug | Sept | Oct | Nov | Dec
1915
1916
1917
Last case left Hospital
New cases only as separately recorded
Relapse cases not differentiated in records & included
Outbreak of diarrhœa & stomatitis with "rashes" in addition during April. Pellagra definitely diagnosed in May

FIG. 3.

[Face page 16.

of resistance to the invasion of bacterial and protozoan disease, and is therefore a contributory factor to a very high rate of mortality.

Special Clinical Meeting.—November 19, 1919

Professor F. M. CAIRD, C.M.G., *President, in the Chair*

I. EXHIBITION OF PATIENTS

1. *Professor F. D. Boyd* showed—

(*a*) A case of SUBACUTE DIFFUSED NEPHRITIS treated by decapsulation of the kidney. The patient was water-logged—1500 oz. drawn off by Southey's tubes. Diuresis followed decapsulation.

(*b*) A patient suffering from a SYPHILITIC LESION of the nervous system in whom the knee-jerks have returned, and the pupil—originally an Argyll-Robertson—now reacts to light.

2. *Dr R. A. Fleming* showed—

(*a*) AORTIC ANEURISM. P. M., æt. 57, admitted to Ward 23 with bronchitis; chest markedly emphysematous. Area of pulsation in pulmonary area. Dull note on pressure over upper part of sternum. Marked tracheal tugging. No evidence of pressure on œsophagus or trachea. X-ray examination demonstrates large aneurism bulging to left and backwards into mediastinum. Wassermann positive.

(*b*) MUSICAL MITRAL SYSTOLIC MURMUR. Aortic incompetence, which developed after admission to ward. W. W., æt. 32, coal-miner, admitted to Ward 23 complaining of rheumatic pains in various joints. Marked musical systolic mitral murmur, musical quality varying in distinctness from day to day, probably due to stenosis of mitral orifice. About a fortnight after admission aortic incompetence developed.

3. *Mr John Fraser* showed—

Two cases illustrative of the operation of TRANSPLANTATION OF URETERS for extroversion of the bladder: subsequent complete excision of the bladder wall.

4. *J. M. Graham* showed—

(*a*) RECURRENT INTUSSUSCEPTION OF THE PELVIC COLON in a case of Hirschsprung's disease. The patient, a female, æt. 23, suffers from dementia præcox. Operation on 20th February 1919. The greater part of the pelvic colon was protruded through the anal canal. After opening the abdomen the invagination was reduced and 12 inches of greatly distended and hypertrophied pelvic colon were excised.

(*b*) Case of CANCER OF THE ŒSOPHAGUS involving the post-cricoid area two years after resection of the growth. Mrs M., æt. 31, married. Dysphagia for two years, and latterly inability to swallow solids. Patient became thin and anæmic. A portion of the growth removed by Dr Logan Turner from the post-cricoid area proved to be squamous epithelioma. Operation on 6th October 1917. A complete segment, including the upper end of the œsophagus and the mucous membrane over the post-cricoid area, was removed. The pharynx was closed and the œsophagus stitched to the skin.

5. *Professor G. Lovell Gulland* showed—

Two cases of SPLENIC ANÆMIA.

6. *Mr J. Hodsdon* showed—

Two cases of BULLET WOUNDS.

(*a*) *Case after removal of bullet from occipital lobe.*—Patient was wounded in June 1915. Bullet entered on left side of vertex and lodged in occipital lobe above tentorium with its base against the skull. The bullet was removed through a trephine opening on 15th November 1915. Returned to service January 1916. Discharged March 1919.

(*b*) Patient was wounded on 3rd December 1915. An arterio-venous aneurism of the carotid was noticed a month later. He was admitted to Infirmary in February 1917. The common carotid and internal jugular were ligatured in two places and the aneurism excised.

7. *Mr A. A. Scot Skirving* showed—

SELECTIVE INJURY TO CAUDA EQUINA following incomplete fracture—dislocation of 3rd lumbar vertebra. *Motor* paralysis only, bilateral and of equal extent, and at its maximum at time

of injury (11th October). No twitchings or shooting pains then or since. For first few days the only muscles acting voluntarily in each leg were the flexors of the toes (feebly) and the sartorii (vigorously). Since then gradual improvement, much more marked in *left* leg. Knee-jerks still absent. Micturition and defæcation have been normal, and no anæsthesia, even of the scrotum and perineum, has been present. Skiagrams show some lateral displacement, towards *right* side, of 3rd lumbar vertebra and spinal column above it.

8. *Sir Harold J. Styles* showed—

(*a*) Patient six months after operation for EPITHELIOMA OF PHARYNX. Tumour involved its posterior and postero-lateral walls from level of epiglottis to œsophagus. Operation consisted in removal of larynx, whole of pharynx below level of hyoid bone, portion of œsophagus, right lobe of thyroid gland, and some of the adjacent lymph glands.

(*b*) Patient after two operations for EPITHELIOMA OF LARYNX. First operation — complete laryngectomy. No evidence of involvement of lymph glands. Second operation, done for recurrence in upper left carotid glands, necessitated also removal of greater part of external carotid artery and upper half of internal jugular vein, hæmorrhage from which could not be arrested by ligature, but only by forceps applied close to base of skull.

9. *Mr David Wallace* showed—

(*a*) Mrs M., æt 29. Complained of frequency of micturition and pain in right side. Pus in urine, and has passed blood. No known cause. Symptoms began more than a year ago. Left kidney easily palpable and enlarged. Right palpable and tender. At night frequency great, and incontinence. Cystoscopy showed cystitis. Bladder held 4 oz. Diagnosis—pyonephrosis of left kidney, probably tuberculous. Operation—left kidney removed. Entirely functionless, a caseous mass.

(*b*) K. W., æt. 9, female. Complained of incontinence of urine and pain in lower part of abdomen. Urine contained pus, but at no time were tubercle bacilli got. Neither kidney palpable. Provisional diagnosis — tuberculous kidney with vesical symptoms. Cystoscopy impossible from small size of

bladder. Operation — cut down on each kidney. Right, healthy. Left, obviously seat of tubercle removed.

10. *Dr D. Chalmers Watson* showed—

(*a*) CHRONIC INDIGESTION; pronounced asthenia. Woman æt. 27. Diagnosed gastric ulcer in 1914; no ulcer found; appendix removed. Operated on for adhesions early in September 1919. On admission dangerously ill. Pronounced asthenia and anæmia, with general symptoms of pronounced toxæmia. Weight 3 st. 11 lb. Examination revealed pronounced atony of the gastro-intestinal musculature, with excessive chronic putrefaction in the bowel. Later, development of pronounced bacteriuria, due to B. coli infection. Marked general improvement after six weeks' treatment, with gain of $1\frac{1}{2}$ st. in weight.

(*b*) CHRONIC INDIGESTION; asthenia; intestinal adhesions. Onset of illness in 1916; characterised by vomiting; general weakness; pain below the left shoulder and loss of weight; on two occasions vomited matter like coffee grounds. Operation in 1916; no ulcer found; appendix removed. Subsequently operated for relief of abdominal hernia. Some improvement in symptoms up till November 1918, but has been off work since that date. Weight 9 st. 3 lb.; normal weight 11 st. General condition of patient unsatisfactory. Presence of tender areas in the abdomen, with evidence of flabby atonic muscles and excessive putrefaction in the bowel. Question of diagnosis and appropriate treatment.

(*c*) ACUTE YELLOW ATROPHY OF THE LIVER. Young man when first seen dangerously ill; intense jaundice; deep saffron colour of skin; unconscious; considerable delirium. Extensive skin eruption in the form of large blotches of intense hyperæmia. Illness of a few weeks' duration. Considerable restriction in the area of liver dulness; vertical dulness being less than 2 inches. Wassermann reaction slightly positive. Recovery; liver dulness $4\frac{3}{4}$ inches; probably the most useful factor in treatment being the administration of an intravenous saline twice daily.

(*d*) INTRACRANIAL TUMOUR. Young man of good physique and good antecedent history. Three fits of Jacksonian type preceded by numbness on the right side of face and in the right arm. Objectively, reduction of motor power in the right arm

and inequality in the knee-jerks and plantar response, with very slight degree of ataxia not always present. No history of specific infection. Wassermann reaction negative. Question of diagnosis and appropriate treatment.

11. *Mr Pirie Watson* showed—

(*a*) Child æt. $1\frac{5}{12}$. On 26th September 1919 the wheel of a loaded baker's van passed over his right hand. Severe bruising and swelling, with extensive abrasions on the dorsal aspect. The radiogram showed transverse fractures of the 2nd, 3rd, 4th, and 5th metacarpals near their bases, with wide separation of the fragments.

(*b*) A case of flat-foot (left) due to spasm of the peronei; treated according to Sir Robert Jones' method by resection of $\frac{3}{4}$ inch from each peroneus $1\frac{1}{2}$ inches above the malleolus.

12. *Mr Henry Wade* showed—

Patient six years after operation of HETEROGENEOUS BONE GRAFT.

Meeting II.—December 3, 1919

Professor F. M. CAIRD, *President, in the Chair*

I. ELECTION OF MEMBERS

Robert Aitken, M.D., M.R.C.P. Ed., 17 Buccleuch Place; Samuel Davidson, M.D. Ed., Kelso; David Lees, D.S.O., M.B., F.R.C.S. Ed., Coates Gardens; Jonathan C. Meakins, M.D. M'Gill, 56 Palmerston Place; Henry H. Robarts, M.D. Ed., D.P.H., Haddington; Robert Sim, M.B., F.R.C.P. Ed., 25 Abercromby Place; Wm. D. D. Small, M.D., F.R.C.P. Ed., 4 Torphichen Street; W. Q. Wood, F.R.C.S. Ed., 48 Northumberland Street; John Young, M.B., Ch.B. Glasg., 2 Mayfield Gardens, were elected Ordinary Members of the Society.

II. Original Communications

AN INTRODUCTION TO PSYCHOTHERAPY

By GEORGE ROBERTSON, Professor of Psychiatry in the University of Edinburgh, and Physician to the Royal Asylum.

THE subject of psychotherapy is one of great importance to the physician, but this truth has only been realised in very recent times. As a science it was unknown and untaught a generation ago. There was indeed some advice occasionally thrown out by our teachers to "treat the patient" as well as his disease, but there was little said as to how this was to be done. More often we heard cheap sneers about "fine bedside manners." Psychotherapy was nevertheless employed by those who sneered, and it was even practised successfully by them as it has been in all ages and in every country. It was, however, practised unconsciously. It was called by other names and its action was attributed to other agencies.

The science of psychotherapy being a comparatively modern one, still labours under many disadvantages. The classical conception of disease adopted in all our textbooks is entirely based upon a materialistic or solid pathology. The symptoms of disease, that is the altered functions, if any attention be paid to them, receive merely a physical or at most a physiological explanation. The treatment of disease is mainly confined to the use of chemical reagents or drugs. It is very necessary to investigate and treat disease from this standpoint, and it is assumed in what follows that such knowledge is essential. It is, however, equally necessary that disease should be studied from a totally different standpoint, a mental one. Not that this new point of view enables us to see the whole picture and the entire structure of disease, but it does give us a very different and a very useful conception of its symptoms and their treatment.

The Symptoms of Disease, Mental.

In the first place, do all physicians realise as fully as they ought to, the extent to which the ordinary symptoms of disease are essentially mental? The typical and most common

symptom of disease is, of course, pain. Short of actual pain we also have the related conditions of malaise, discomfort, uneasiness, ill-being, etc. These are really all different forms of pain; pain more vague and less acute, pain more diffuse and less localised. From this point of view let us now picture a patient suffering from lobar pneumonia, having expelled from our minds for the moment, not an easy task for the scientific physician, all preconceived and dominating ideas of a solidified lung or an organismal toxæmia, and what do we find? Almost every symptom of which the patient complains to his physician is included under pain, discomfort, or ill-being. Pain is a form of sensation and it is a purely mental phenomenon. The processes accompanying this sensation occur in the higher realms of the brain. To feel pain acutely and to localise it exactly, it is necessary to be fully conscious. If the mind be in abeyance, if the patient be unconscious, as for example under chloroform, the patient does not suffer pain. If by means of psychotherapeutic measures, without being rendered totally unconscious, pain and malaise can not be felt by the patient, he is relieved of almost all his symptoms and his sufferings, as surely as if he were chloroformed. These complaints, be it remembered, are the only matters which the patient is concerned with, and not with his hepatised lung or toxæmia. He knows nothing about these and the less he knows the better.

A practical demonstration of these facts was given to me nearly thirty years ago, when I accompanied Professor Bernheim round his wards in the Hospital of Nancy. He came to a patient suffering from pneumonia and asked the usual questions about sleep, appetite, well-being, progress, etc. He then, by slight hypnosis, dispelled by suggestion all unpleasant symptoms and implanted a favourable atmosphere and outlook in the mind of the patient. He did not neglect to treat the patient by the usual drugs on orthodox lines, but his patient suffered less owing to the employment of psychotherapy in combination with these drugs. In a critical case this auxiliary relief might have turned the scale and saved the patient's life.

Further, with regard to symptoms, of which pain is the type, there is confusion in the minds of most physicians between the nature of what is imaginary or functional and what is organic. They can understand, they say, the symptom of pain produced

by the imagination being removed by psychotherapy, but they do not see how the symptom of pain due to an organic cause can so be relieved. There is, however, no essential difference between these classes of pain. Let us take for example the pain, often very severe, that is due to a carious tooth or a whitlow. The organic disease is in the tooth or finger and in the nerve endings there, but the pain is felt accompanying processes that are taking place within the brain, where there is no disease at all. If the whitlow be in the little finger and the ulnar nerve be divided, the patient does not suffer pain, though the whitlow runs its usual course. The mental phenomena are therefore the same whatever be the variety of pain, whether of so-called imaginary and functional origin or of organic origin, and all forms of pain being mental symptoms, are amenable to psychotherapy. It is not alleged that all varieties of pain are equally amenable, just as it is not alleged that all persons and all ages are equally amenable. Pain and its analogues, malaise, discomfort, ill-being, etc., whether of functional or organic origin, being essentially mental phenomena arising in the brain, can all be removed by psychotherapy.

As a concrete example of this generalisation, I give the case of the wife of the late General Booth who suffered agonies from cancer. She was induced, when all else had failed, to try Count Mattei's remedy, which consisted, we are told, of electricity extracted from growing plants preserved in distilled water, and it was of various colours, red, green, blue, etc., for various ailments. The first few drops of this remedy removed all Mrs Booth's pain, and she eventually died without any further suffering. In this case of an inoperable cancer, this result was the best that could possibly have been obtained by the most famous and skilful physician or surgeon, and it must have seemed to the patient like a blessing sent from heaven. It so impressed Mr Stead, an honest and fearless man if ever there was one, that he advertised the remedy largely. Needless to say the remedy itself is inert, and the result was purely psychotherapeutic; but if such blessed relief from suffering can be obtained so simply, why should not every physician know about it? Why should he not have the power of conferring it? and why should anyone be ashamed of benefiting his patients by the employment of such simple means?

Further, it may be pointed out that the distinction between ordinary physical pain and what is often called mental pain is more indefinite than is realised. They are frequently confused with one another and they often coexist. I have seen a boy receive a great disappointment who at once complained of headache and illness, though he was really suffering from mental depression. I have known a very suicidal patient complain of acute pain who could not tell me where the pain was, because she was really suffering from melancholia. On the other hand, Dr Haultain has told me of a lady who every time her uterus became displaced, instead of complaining of discomfort, suffered from depression, which at once disappeared when the error was rectified. Finally, I have known a patient suffering from melancholia at first attribute her condition to ill health and consumption. I thereupon, as a psychotherapeutic procedure, called in Sir Robert Philip, who assured her that her lungs were healthy, and having faith in him she accepted his suggestion. Then she developed the idea that her state was not a physical but a moral one. She believed that she was suffering punishment for having committed sin, and that she had been cast off by God. The conversion of mental into physical pain, and *vice versa*, is seen from these examples to be a simple process, and it therefore accentuates what has already been said of the essentially mental nature of the symptoms of disease.

The two illustrations of symptoms relieved, namely that of pneumonia and that of cancer, representing a very large class of cases, are examples of negative hallucination. That is to say, by some mental process the mind ignores, rejects, or is unable to receive sensations of a certain class. Consciousness appears to be normal, but it has a blind spot or an area of anæsthesia to a definite class of sensations forming the symptoms. An experiment illustrating these features is easily performed on a good hypnotic subject by giving her a post hypnotic suggestion that on awakening from hypnosis she is not to see a particular individual present in the room. The result is very curious and often amusing. The person indicated is completely ignored, and the patient does not appear to be even conscious that the body of this person is blotting out part of the landscape, if he stands between the patient and an object. This observation

is the less remarkable when it is remembered that no one is conscious of the blind spot in his own eye which blots out a part of the visual field. Hysterical anæsthesia is, of course, a typical example of negative hallucination, of this failure to be conscious of stimuli affecting certain nerves and organs of sense.

Suggestion in Disease and Treatment.

If negative hallucinations be of greater service in the removal of symptoms, positive hallucinations explain more frequently their occurrence. It is known that if the experiment be made of fixing the attention closely for a long time on one part of the body, that sensations or symptoms will be experienced there. Especially is this the case under two conditions, firstly, if emotion be present, that is, if the patient be expectant or if he be anxious or apprehensive of harm, and secondly, if an idea has been consciously or unconsciously suggested to the patient, either by himself or another. For example, Dubois set up an electric battery, with wires terminating in rings which were placed on the fingers of certain persons. The arms of the dial regulating the strength of the current were then moved about. Two-thirds of those upon whom the experiment was made felt a current of electricity passing through their fingers, although the whole apparatus was a make-up and the arms of the dial were moved merely to convey a suggestion. It follows that the physician must realise fully the part played by suggestion and suggestibility in disease. This varies very greatly in different persons. It is more marked in children than in adults, and in women than in men. It varies from time to time in the same person, and is more marked when he is under the influence of strong emotion. It is most marked when the patient is exhausted, and when he is suffering from a toxæmia. The ideal state for its operation is when these conditions are all present together and when the inheritance of the patient is a highly neurotic one. For example, in patients suffering from mild delirium tremens, I have been able to suggest any symptom I pleased, and as many as I pleased. In some cases, even if the patient be handed a clean sheet of paper, told it is a letter from a friend and asked to read it aloud, he will do so.

Now the important point to be realised is this, that every

one, even the most strong-minded, is suggestible. Indeed, one who is regarded as a particularly strong-minded person may be specially suggestible to hypochondriacal ideas. In every case of illness, then, it is possible that some of the symptoms of which the patient complains are the result of suggestion alone, and in more cases than is suspected, most of the symptoms may be due to this cause. They therefore would come under the category of being purely functional. One simple case that made an early and a deep impression upon me, was that of a young relative who was under my close observation. He suffered from a severe attack of sciatica from which he had obviously recovered. His general activity, his athletic feats, and his high spirits were sufficient evidence of this. When, however, any visitor asked him how he felt and directed his attention to the subject, his face fell, his tones became lugubrious, and he complained that he was far from being well. Deceit was here out of the question. At the most he may have got more sympathy than he deserved. If he had been consciously or unconsciously encouraged, if he had by chance been placed in a suitable atmosphere, he would have continued to believe in his imaginary pain for an indefinite time.

Further, as regards unconscious tension, rigidity or immobility of muscle, I found a very good example in myself recently. I had a small abscess in my axilla which I treated with a boracic poultice. To keep the dressing in its place I held my arm tight to my side, and I had most need to do this when I was dressing. Some days after the abscess had recovered, I found myself one morning unconsciously holding my arm in a constrained and tight position to my side. After some thought I discovered the unconscious mental origin of this, and as a result was able to cure myself of this now useless habit.

The above cases have the two-fold merit of being very simple and quite reliable. They lead up to that large group of cases in which recovery from injuries, accompanied by pain and rigidity, received during the War, was very slow indeed. These in their turn are not essentially different from the still larger group of cases in which the injury was slight and the symptoms should have been evanescent, but which became chronic, developed in number and importance, and eventually produced serious disabilities. These symptoms were mainly due to auto-suggestion

and were removable by psychotherapy. There was an interesting article on the "Hysterical Complications of Rheumatism," by Dr Gordon, in the October number of the *Edinburgh Medical Journal*, giving examples of such cases.

The instances I have given above are of auto-suggestion, but suggestion may be given by others, and the person who is most likely to give it is the nurse or relative in attendance, or even the physician himself. It is of course given unconsciously and it is usually adopted unconsciously. It is a fault that the most attentive, the most thorough, and the most devoted physician is the most likely to fall into. The more frequently he examines a patient, the more enquiries he makes of symptoms, and the more remedies he applies, the greater is the likelihood of him implanting suggestions, especially if his efforts be supplemented by the attentions of a sympathetic and devoted relative. Many cases of long continued ailments and invalidism are mainly due to this cause. If anyone doubts it, let him think of the great Charcot and his cases of hysteria. I enjoyed the privilege of a demonstration from him of their extraordinary symptomatology, and we now know that these remarkable symptoms of a wonderful series of cases of hysteria major, each presenting dramatic features, were all unconsciously suggested by him and his assistants. If such an accurate and careful observer, one of the greatest medical men that ever lived, fell into this pit, may not lesser mortals like ourselves do the same.

Disease in any part of the body, especially if it be of a toxic nature, affects the mind and lowers the normal level of its working, so that this becomes more feminine, and more childish in character. The patient then becomes more suggestible, both to his own fancies and to the influence exerted on him by others for good or for evil. It is therefore an essential part of scientific treatment under these conditions that the source of this toxin should be removed, that the toxin should be flushed out of the system, or that its activity should be neutralised by an antidote or serum, if any of these measures be possible, when use is made of psychotherapy.

Action of the Mind on the Body.

In the third place the physician must realise the extent to which the mind may act on the body and every one of its functions. Some are prepared to admit that all nervous disorders, excepting those directly due to destruction of nervous tissues, may be removed by psychotherapy, but believe that its usefulness is strictly limited to functional nervous disorders. In answer to this it must of course be admitted that psychotherapy cannot destroy the syphilitic spirochæte, cannot remove a clot from the internal capsule, and cannot repair any serious organic change. If it cannot effect a cure in cases of advanced disease accompanied by organic changes, it differs little in this from ordinary therapy, while in almost every instance it can assist and give relief to suffering as in Mrs Booth's case. In the early stages of disease, before serious organic changes have actually resulted, and in the stage when recoveries by any therapeutic means whatever can be hoped for, the influence of the mind over the body is enormous and is insufficiently realised. Further, the line of demarcation between mental and nervous processes on the one hand, and obvious physical changes and organic disease of the body on the other, is becoming more blurred and uncertain every day with increasing knowledge. They are found to overlap and coexist, to be mixed and fused. This is, for example, the case with the emotions. Can anyone assert that the part played by consciousness in the feeling of fright is biologically a more essential part of fright than its well-known motor, secretory, and vaso-motor accompaniments? According to James the latter are the primary and essential elements of the emotion. We now know also how close is the connection between the internal secretory glands and emotion. If fright and anxiety, for anxiety according to Hughlings Jackson is only fright spread out thin, be accompanied by an excess of adrenal secretion, how many chronic disorders and ultimately organic changes may not be traced to the mind through excess of this secretion? Vascular disease, kidney disease, heart disease, and many sclerotic diseases may have an origin of this kind. That the mind can act upon the body and can influence every function is a well-established fact. It affects digestion, it acts on the heart and circulation, and may even go

the length of producing organic changes. I need only mention as a conclusive example of the last, that blisters can be produced by means of mental suggestion alone. During the War this experiment was again performed successfully on a soldier in a military hospital, in which case every possible precaution was taken by means of protective dressings to prevent access to the part by the patient or others. In addition, to make assurance doubly sure and to eliminate every chance of fraud, a military guard was placed on duty over the patient.

While the action of the mind on the body is so extensive, needless to say it has its limitations. It is still necessary for the physician to study pathology and to become a skilled clinician. His failure to diagnose disease might otherwise result in his failure to adopt other measures, as in the case of an operable cancer. It might also result in his adoption of psychotherapy for the treatment of an irrecoverable condition. Psychotherapy as distinguished from all those related practices which insensibly and inevitably pass into superstition, humbug, and fraud, can only be preserved in an honest and pure form in the keeping of an educated and skilled profession, with honourable traditions and a scientific spirit.

The Practice of Psychotherapy.

Having now described the mental nature of the common symptoms of disease, the place suggestion plays in the causation of symptoms and their cure, and the influence of the mind on the body, I now pass to refer to the practice of pyschotherapy which is based upon this knowledge. It was first employed consciously and intentionally in the medical profession by Pinel, when he introduced what he called the "Moral treatment of the Insane," during the French Revolution. He then undoubtedly took the first step in scientific psychotherapy. The next advance was probably made when Liebault and Bernheim at Nancy, about 1880, consciously employed mental suggestion under hypnosis to remove the symptoms of disease. Soon after this they discovered that suggestion could often be equally efficacious in the waking state. This discovery at once threw a flood of light on a whole host of miraculous cures, which had troubled the minds of

regular practitioners of medicine for generations, and cast a slur on their professional skill. It was perceived that mental suggestion and the influence of the mind on the body could account satisfactorily for these wonderful recoveries, and every year has added proof confirming this opinion.

To draw out a complete list of the agencies employed in the past, whose action was essentially psychotherapeutic, though attributed to some other quality, would take a considerable time. Their employment goes back to prehistoric days and to utter barbarism. They are, however, still popular to-day, and that even among the most educated and civilised peoples of the world. Out of a long list may be mentioned, first, amulets and charms, faith in which has not yet died out. Even the humble potato carried on the person is believed by many to-day to ward off rheumatism. In the past curious nostrums of all kinds, such as the wonderful Weapon Salve and the Sympathetic Powder, were believed in. The former cured wounds when the weapon that caused the wound was itself anointed with the salve; the latter cured by sympathy when the blood-stained garments worn by the wounded man were dusted with the powder. The success of these remedies is, however, paralleled by that of some of the much advertised patent medicines of the present day, whose contents are well known to be inert. Faith cures and cures by means of religious relics at one period played a most important rôle in therapeutics, and still do so. In modern times, with the spread of scientific knowledge and psychical research, many have pinned their faith to animal magnetism and mesmerism. Others still more recently to mind cures and Christian science.

That these purely psychotherapeutic measures, however absurd and inherently impotent, were, and are, successful, cannot possibly be denied. For regular practitioners of medicine to ignore their striking successes is conduct on a par with that of the ostrich which buries its head in the sand. It is believed, for example, that during the time that Perkins' Tractors maintained their reputation, a period of about ten years, they effected more wonderful cures than any other therapeutic agency then employed. Their success was simply phenomenal. Yet when it was found that spurious tractors were equally successful, if the patient did not suspect their genuineness, their success left them

suddenly for ever. The history of their employment, however, enforces on us very important lessons. It teaches us firstly, that faith alone is a most potent curative agent; secondly, that the majority of the ordinary symptoms complained of are mental in nature and removable; and thirdly, that successful results in the treatment of disease, unless the psychotherapeutic factor has been absolutely excluded, is no proof of the action of any drug or other agent that may happen to have been employed. The success of many new drugs is notoriously psychotherapeutic. They come into fashion and are then cast aside as worthless with monotonous regularity—hence the advice, "Hurry up and prescribe the new medicine, while it still cures."

Methods of Psychotherapy.

The scientific practice of psychotherapy by regular practitioners of medicine has passed through the following developments: firstly, that of suggestion in the hypnotic state; secondly, that of suggestion in the waking state; thirdly, that of persuasion and of re-education.

Immediate success often follows suggestion whether given under hypnosis or without it, and this is often all that is necessary in the case of slight and transient symptoms. In the more serious and chronic states the removal of a particular symptom by suggestion does not produce a permanent recovery, as it does not remove the underlying condition of morbid suggestibility to which the symptom is due. It is then naturally found that relapses often occur. A new symptom takes the place of that which has been rejected, and the last state of the patient may be worse than the first. To overcome this underlying suggestibility and to strengthen the will to resist, Dubois introduced the method of persuasion, which consists of heart to heart talks with the patient on the whole subject of his nervous symptoms. This of course presupposes an intimate knowledge of psychology, psychopathology, and human nature on the part of the physician, as well as rare personal qualities. Dubois states that persuasion should be honest, logical, and rational, a combination of argument, explanation, and education. He thinks that a direct appeal should be made to the intellect, but one cannot get away from the psychological fact that all degrees of

belief are essentially effects. In states of doubt, probability, and certainty, feeling as well as the intellect is involved. James has accordingly said that a person may even sweat with conviction without knowing what it was about. Hope, expectation, faith, belief, conviction must be present, for according to Dejerine, persuasion can only be successful when such feelings have been influenced as well as the intellect. The employment of the term persuasion is itself a proof of this emotional colouring, for no one would think of describing the cold process of clear reasoning that Euclid employs by the name persuasion. Persuasion therefore is to some extent the form of suggestion that is suitable for a patient in the waking state.

Upon the element of education, or as it is often called re-education, largely rests the completeness and permanence of the cure, for by it the patient is given an insight into his general mental condition. The mental nature of his symptoms is explained to him, he is encouraged in his resistance to morbid habits of mind, and his mental outlook is brightened. He is thus brought nearer to the normal. To these processes Dr William Brown has given the appropriate name of autognosis, for by them the physician unravels the tangled past of the patient's life and reveals to him his present difficulties. He demonstrates the connection between these mental antecedents and the symptoms of which the patient complains. When once these are understood by the patient and acted upon, he is cured, for his mal-adaptations cease when he knows himself.

These various methods, hypnosis, suggestion, persuasion, and re-education, although described separately, may all be combined in the treatment of the same case, with profit, if thought necessary.

During the last ten or fifteen years it has finally been found that the patient may occasionally be influenced, and influenced most profoundly, by feelings and ideas of which he is quite unconscious. He is then not able to co-operate in his treatment, and no persuasion and no explanation is of any use till the hidden and unconscious origin of his mental or nervous symptoms has been uncovered, brought into the light of day and found out. The process by which this can be done is known as Psycho-analysis. It is not only a method of analysing the mind and a new psychology, but it is also a form of psychotherapy as it is

accompanied by relief from the symptoms. It is mainly of use in the more serious neuroses and psychoneuroses.

The discoveries resulting from the practice of psychoanalysis have revolutionised our conception of the constitution of the human mind. In place of the old and medically useless philosophical psychology, it has laid the foundations of a new and practical psychopathology. It has introduced us to many new ideas, such as those of complexes, conflicts, repression, resistance, amnesia, the unconscious, symbolism, conversion, displacement, etc., and these have undoubtedly been of help in understanding mental and nervous symptoms and in their treatment.

New methods of examination have been introduced to probe the unconscious mind, of which three may be mentioned :—The word association test ; the method of free association of ideas ; and the analysis of dreams. By the first method a stimulus word is spoken, and the word or idea it calls up in the mind of the patient is immediately given and recorded, together with the exact interval of time the process has taken. It is found that a hidden and unknown anxiety will affect the reply by delaying it and by giving a peculiar colour to it, and one thus gets on the track of the unconscious conflict.

Free association of ideas consists in allowing the patient to talk at random, quite aimlessly, anything, however nonsensical, that comes into his head, without exercising any control or direction whatever, and it is found that the ideas, however absurd they may seem, inevitably gravitate to certain subjects, relating to the origin of the symptoms.

The interpretation of dreams has been called the royal road to the unconscious mind. The methods of interpretation have been described by Freud in his work on Dreams, and no one who honestly applies these methods to the interpretation of his own dreams can fail to be convinced of their essential accuracy. The truth of their latent or hidden meaning thus disclosed will fill him with amazement, not unmixed at first with feelings of horror.

Psychoanalysis has its limitations and drawbacks. It is not usually successful in curing persons above middle age ; even when successful the treatment may take months, or even longer ; and in many cases its complicated procedures are really quite unnecessary and a waste of time and money. In the hands of

those who are not careful or skilled, it has given offence and done harm.

Personality the Paramount Factor.

Having now dealt briefly with the various psychotherapeutic methods, and taking a broad survey of the art of healing, I affirm that the greatest therapeutic agent, alas! so often employed unconsciously and in a haphazard way, is the personality of the physician himself. It is not his drugs but the faith his patients have in him that is the secret of his success. Oliver Wendell Holmes held that, if all the drugs that have ever been prescribed had been thrown into the sea, mankind would have been the better for it, and this opinion confirms the truth of the view that the active agent in effecting a cure is the physician. This is, of course, not so in every case of illness, but in the vast majority the hope and confidence begotten by faith in the physician, combined with the *vis medicatrix naturæ*, account in the main for the cure. Faith in the personality of the physician is therefore the greatest therapeutic agent of all. It is the paramount factor in the therapeutic world, though one does not find it included in the British Pharmacopœia, nor is value given to the student who is able to inspire it, in the final professional examination. Want of faith in the physician, on the other hand, or anxiety on his own part, indicating a want of confidence in himself, or solicitude on the part of a relative, likewise implying some degree of doubt, may counteract the influence of the most potent drugs. The instinct of the patient to change his doctor when he has lost faith in him is founded on sound psychotherapeutic principles.

While the personality of the physician is therefore the main factor, no physician who has not given special attention to this subject has the faintest idea of the extent to which he employs psychotherapy unconsciously in his own practice. He is consequently quite ignorant of its importance and of its effects, and his power is less efficient and useful than it might be if carefully directed. When I came back from a visit to Paris and Nancy, where the whole attention was being given at the time to Mental Suggestion, I found to my surprise that Dr Clouston, in

his visits to his patients, was employing exactly the same words and phrases, implanting exactly the same ideas, and creating the same atmosphere as the hypnotists in France. Thus, without being conscious of what he was doing, without attaching any particular value to it, and without any real recognition of its effects, he was most successfully practising mental suggestion and persuasion every day of his life, upon every patient that he treated. So it is with every successful practitioner in the country. Nor by words alone is mental suggestion conveyed. It may be given in a hundred subtle ways which should all be carefully thought out and studied—for no two persons can be treated with the greatest measure of success in exactly the same way. Among the poor of the dispensary class it is well known that no form of psychotherapy will avail unless it be accompanied by a bottle, however innocent its ingredients. In the West End, the success of psychotherapeutic treatment may depend in part on the fee paid for it. A physician hardly ever prescribes without telling the patient that the medicine he orders is going to do this, that, or the other thing, yet he scarcely ever realises that these few simple words of his may be the essential ingredient in the prescription, without which the medicine would be useless.

In conclusion, every practitioner and student of medicine must be taught the paramount part the mind plays in the chief symptoms of disease, and he must employ in the treatment of these, mental suggestion, persuasion, and re-education, not unconsciously as in the past but with a set purpose and with confidence. His success will depend on the depth of his conviction. If he possesses the gift of healing, the mystic personality that inspires faith in the sick man by which he is made whole, he will not usually require to use either hypnotism or psychoanalysis, though each has its place in therapeutics.

Discussion

Dr T. Murray-Lyon.—It is a matter of common experience that a large number of patients do not benefit from ordinary medical and surgical means—medicine, operation, change of air and scene leaving them as before. They may appear organically sound in spite of the occurrence of functional disorder, and often

suffer from fears, anxiety, and obsessions without any adequate cause. For such cases psychotherapy is eminently suited.

All diseases have their psychical side, and while psychotherapy is not claimed as a panacea where the psychical symptoms predominate, cure or benefit is brought about by the use of one or other of its methods. This treatment is not by any means new, but it is now being used in a more intensive form, and during the war it has received a very definite impetus as Hospitals were opened for the training of medical officers and the treatment of soldiers and sailors suffering from functional nervous conditions resulting from war strain. Maghall Hospital, near Liverpool, passed out thousands cured or at least greatly benefited.

What psychotherapeutics is :—

It is the method of treatment by which certain abnormal conditions of mind and body can be cured (or relieved) by means of the mind ; it is diagnostic as well as therapeutic, and is largely educative, and it requires the intelligent co-operation of the patient. (The mind is conceived as consisting at birth of a bundle of instincts, and abnormality of mind is brought about by over action or lessened action in any of the fundamental instincts.)

For its successful practice certain well-established facts and laws are recognised and made use of, viz. :—the suggestibility of individuals ; effects of strong emotions ; that physical conditions are affected by mind and *vice versa ;* that thoughts and acts tend to become automatic and permanent ; that memories are conserved and complexes formed ; that dissociation and synthesis occur.

Forms of psychotherapy :—

1. Simple explanation.
2. Suggestion and persuasion.

Every one is suggestible, and frequent repetition has a cumulative effect. These may be used—

(1) in the waking state ;
(2) in the hypnotic state ;
(3) in the hypnoidal state.

The object is the development of the patient's will power and control of his organism, and to teach him to be independent of outside help. The will can be enormously increased, and

hence success so frequent in cases of drunkenness, drug habits, etc. The hypnoidal state is short of hypnosis, and suggestibility is very much heightened: it is a condition of physical and mental relaxation.

3. Psychoanalysis, not necessarily Freud's method in its entirety.

Freud's theory gives us a working hypothesis, the most important point being that every element in our conscious mentality is psychically determined, and that the determining factors are open to mental influences—reason, persuasion, suggestion. He holds that the symptoms in the psychoneuroses owe their origin to conflict between opposing ideas or emotions which cannot be brought into harmony, and are repressed and take on an automatic existence which acts as a mental irritant.

By means of psychoanalysis one gets at the cause of the symptoms, with resulting cure or benefit—the patient bringing out information (1) either that he knew but did not understand its significance or importance, (2) that he did not want to tell, or (3) that he was utterly ignorant of, having quite forgotten the experiences revived in the process.

Dr Marr.—In the past five years I have had the opportunity of examining more than 9000 cases of neurasthenia or so-called shell shock, and as the treatment I have followed has had more permanent results than psychotherapy as at present practised, I shall confine myself mainly to the reasons for my adoption of ordinary therapy.

Psychotherapy in its best and truest sense simply implies those desirable qualities in the physician or observer—tact, sympathy, kindness, firmness, skill, and experience—whereby he gains the confidence of the patient and ultimately restores this confidence back to the patient so that he has confidence in himself.

The ostensible self in any individual under observation is easy of examination, and the value of such an examination depends on the accuracy or experience of the observer. That inner mental and spiritual hinterland, as Wells calls it in his *New Machiavelli*, is more difficult of examination.

The methods of psychoanalysis as used in psychotherapy, and which should really be called methods of psychosynthesis,

are in my opinion not only unreliable and of less value than the usual direct and introspective methods of mental examination, they are so harmful that the few advantages of the system in no way compensate.

In psychoanalysis more or less hypnotic suggestion is used. Consider the condition of mind thus laid open to psychoanalysis. The personality of the consciousness is abolished and the dream-state only is available for examination.

This dream-state is always a painful one, as the sense of orientation is abolished, and what is experienced is always conducive to anxiety and fear. Again, in this condition facts are elicited which generally have little or no relation to the personality of the individual, and if facts are discovered which have reference to the ego they are isolated, unusual, and only incidental.

The psychotherapist ventilates the theory that the depression in neurasthenia refers to some shock which has happened to the individual who is affected, and from his examination of the dream-state he selects what seems to have been the likely original fear. He induces a reaction from this fear, and records, as he puts it, the memories associated with the particular shock in question. By a preaction, by suggestion he cures the condition. I have never seen a successful cure from these experiments, nor do I expect to see it, believing as I do that all the hysterical or suggestive phenomena are primarily due to exhaustion of the mental centres in a person whose mental centres are predisposed by neurotic inheritance to become unstable by stress and strain of any kind whatsoever. This mental exhaustion lowers the whole tone of the body, in particular those parts supplied by the sympathetic nervous system. Poisons are thus enabled to accumulate in the circulation, and by their action and reaction so affect the mental centres as to produce the protean symptoms known as hysteria. Hysteria, in other words, is a toxic condition. A therapy which is based on natural means, by ridding the body of poisonous substances formed in the circulation, is the most efficacious and practical means of restoring the mental centres to the condition of health normal to the affected individual.

Dr Yellowlees.—If, as a mere visitor, I may venture to

trespass upon the time and patience of the Society, there are one or two points which I should greatly like to bring forward in this most interesting discussion. The first is a reminder of the fact that by analytic methods one does not by any means necessarily refer to the psychoanalysis of Freud. It should, I think, be insisted upon that lesser degrees of analysis may be productive of eminently satisfactory results in many cases. Many a physician, disheartened by his attempts to follow out the Freudian doctrines in their entirety, and perhaps very sceptical of that portion of them which he can clearly follow, has, I believe, yielded to the temptation to throw up the whole subject either in despair as being beyond him, or in disgust as being futile.

Whatever may be said for or against psychoanalysis as the term is used by Freud, it is certainly no form of treatment for an otherwise busy man to undertake. One often sees a tremendous amount of time and energy wasted in dealing upon complete and orthodox Freudian lines with a functional case in which a very much slighter degree of analytic treatment would have been amply sufficient, and could have been readily and easily applied by a physician who knew his subject and his patient in a few interviews. A case which I sent home from France in which the result, though quite satisfactory as far as it went, was by no means a complete cure, came into the hands of an enthusiast who always occurs to me in this connection. About a year later I learned that the case, although no nearer complete cure, had been demonstrated beyond all doubt to be "an unconscious homosexual with well-marked anal erotism." This was striking news, but it does not weigh on my conscience to think that I treated him by an analysis on much less subtle lines than those of Freud, in the simple faith that he was a traumatic neurasthenic. I think that such instances of inability to see the wood for the trees are very common. The last thing I would wish to do would be to scoff in any way at the Freudian doctrines, although I believe that many of them are unproved and some few are, to my mind, definitely disproved. The fact remains, however, that his services to psychotherapy are incalculable, and that no physician can hope to deal satisfactorily with, I would say, the majority of functional nervous disorders which come his way until he has a clear picture of

what is meant by such terms as repression, conflict, complex, sublimation, transference and the like, and is prepared to do a certain amount of analysis in many instances. It is Freud who has expounded and clarified these mechanisms and the principles governing them, and who has made analytic methods a practical psychotherapeutic weapon.

Another point which I regard as of the very greatest importance is this, that indissolubly bound up with any analytic procedure is, or ought to be, a process of re-education, and I believe this is not sufficiently insisted upon, either in the theory or practice of analytic methods. It is useless to *break down* unless one is prepared to *build up again*, and we will do a patient small service by dragging his hidden conflicts to light and leaving him sitting among the ruins of his defence mechanisms. To take a very simple instance to illustrate the necessity for analysis, and the equal necessity for re-education in a common class of case: A woman of thirty, who devotes her entire time to nursing her invalid mother, and sees her chances of marriage slipping away, consults us for some functional nervous disease. She may, for example, complain of purely physical symptoms, and be what is known as a gastropath; she may have a simple "neurasthenic attack," or, most likely of all, if she is a suitably constituted and predisposed person, she may complain of some phobia, *e.g.*, a terrible dread of injuring her mother by faulty treatment, mistaking medicine bottles, etc. Such a case, it is surely obvious, will never be cured by any form of bath, electricity, massage, or Weir Mitchell treatment that ever existed, any more than by all the drugs in the pharmacopœia, or all the changes of air on the face of the globe. Two things are quite essential. Firstly, the fact that she is in the grip of a conflict between two very powerful instincts must be made clear, both to herself and her physician. In the very obviously clear and simple case I have taken, this may seem apparent from the outset. In the majority of cases the conflict is far less clearly defined, and it is for the physician, by analysis, to find it out. In every neurasthenic there is an underlying emotional strain, upset, or, as Dejerine calls it, pre-occupation, which is not readily revealed by the patient, usually because it is a conflict of which he is not fully conscious himself. Till the nature of this pre-occupation has been made

fully clear no real cure is possible. Even in this clear case it is quite probable that it would never have occurred to the patient, and I am quite sure that she would be greatly surprised were it pointed out to her that she is in the grip of such a conflict, and that the only rational solution, which will do violence to neither element of the conflict, is for the mother to die.

The second essential concerns the process of re-education. That force which Freud calls "libido," Bergson, "élan vital," and Jung, "interest," has been turned inwards, wasted and "unfixed," while the unconscious or half-conscious conflict has been raging. It is for the physician to direct it, once the matter has been laid bare to the patient, towards channels in which it will attach itself to some thing or things outside the patient, and develop along healthy and natural lines. This is the essence of the process of re-education.

One could enlarge very greatly on this matter, and there are also a large number of other points and remarks of previous speakers upon which I would like to touch, but I have already exceeded my time and must resume my seat, thanking you for your patience, which I hope I have not completely exhausted.

Dr Chalmers Watson.—It is, I think, fortunate for medicine that the war has brought into such striking relief the profound importance of the psychological factor in treatment. Long before the war some of us realised the value of this factor and regretted the complete lack of instruction given, both to medical students and to nurses. The numerous cases supplied by the war have fortunately drawn attention to its importance. As in many other positions, one has come across considerable numbers of cases, both occurring as a result of military service and otherwise, in which the essential factor in treatment was the psychological one, and these cases have led one to review one's previous knowledge and experience, and more especially in the light of the comparatively new signs of psychoanalysis, as applied to the investigation of brain function. I believe there is an important future before what is now called "Psychoanalysis," but only, however, if a broader conception is given to that term than is at present given to it by some psychoanalysts.

The first case I saw in which a medical friend applied his

special experience and training in psychoanalysis to the investigation of cases, which I saw before and after his treatment, gave results which were decidedly ludicrous, and were by no means advantageous to the patient. And one readily can understand this when one knows the type of questions that were being asked, and the answers to the same questions that, if truly given, would necessarily be set forth by a large proportion of professional men. Considerable care and general knowledge of the world is necessary in drawing conclusions with regard to repression, and other phenomena, that come within the special view of the psychoanalyst. I am far from being a sceptic as regards psychoanalysis, but I am quite certain of this, that in not a few instances it is possible to get into a patient's mind by simpler methods than those followed by the strict psychoanalyst. I have, for example, on many occasions had cases under my care in Ward 3 which very definitely appeared to indicate the phenomena of repression; cases of attempted suicide by drowning or other means, which dated from the accidental drowning of a child, or from some such incident as arrangements being made for an illegitimate child. In such cases I have seen complete recovery from very definite mental symptoms follow the relief from this sub-conscious repression, this recovery being complete for as many weeks or months as the patients were traced.

The second group of cases—of which I have seen quite a number—are those purely arising out of the war, which come under the category of so-called "Shell-shock"; frequently men who have been in receipt of pensions for many months or years; men who have been through many hospitals at home and abroad, and have frequently seen innumerable medical men. I have often seen in these cases a rapid and apparently complete recovery established very quickly, and by very simple means. In these cases I have always found that, according to the patient's statement, none of the many medical men whom they had seen had taken the trouble to simply and adequately explain to the patient the nature of his or her disorder. Their mental attitude was based firstly on ignorance, and secondly on apprehension, which in turn was based on their lack of knowledge, and was in the circumstances wholly justifiable, and was greatly contributed to by the complete failure of the numerous methods

of treatment which they had previously undergone. In some of these cases the patient was led to believe by one of the medical men that there was nothing the matter with him, and the reflection suggested by this opinion was not calculated to heal the condition. In other instances I have seen patients, sometimes the same patients, who had definitely derived the impression from another medical man that they would never be any better; that the condition was incurable. Here again the impressions derived from this experience were of an injurious kind. You have got to cut the old connections and re-establish new ones; and as I have indicated, the first essential is for the doctor to take the patient into his confidence and to re-explain the condition, and so lay the foundation for that confidence of the patient without which no treatment will be successful.

Many physical methods of treatment are helpful in re-establishing recovery in such cases. But a word of warning is necessary in this direction. I always, in such cases, take pains to find out the details of the different physical methods of treatment which have been previously adopted by those who have gone before, and I take care never to repeat them; or I repeat them with important variations, and I emphasise the value of these variations to the treatment. The necessity for this will be self-obvious. The patient has often had unlimited courses of massage, tonics, electricity, etc., and he is quite satisfied that they have done him no good. If you think it desirable to repeat these methods there is, in my experience, little prospect of success attending them, unless there is some radical change of method from what has gone before. By realising the importance of treating the patient as an intelligent human being, by explaining very fully to him in simple language all the essential factors in his condition, and by using skilfully one or other or many of the various forms of recognised medical treatment, a vast proportion of the cases that I am considering, and they are very large in number, will be speedily restored. In nineteen cases out of twenty they are only too willing to be weaned back towards recovery.

The whole subject of the mental factor in medicine is an extraordinarily wide one, and fascinatingly interesting. I do not know what views most of the general practitioners here hold as to the general value of the mental factor in their everyday

routine work, in what are called common everyday medical cases. I am personally satisfied that 50 per cent. of the medical cases (that is, I believe, a gross under-estimate) of the therapeutic value of the practitioner's services is explained by psychological influences, the various medicinal and other methods which he has employed being of little material, but often of great psychological value. The whole subject is one of the first importance, and is wide and fascinating. A discussion of this kind may be of value in drawing attention to its importance. If the profession generally come to recognise its importance they will come to see that in the past their attitude to what are called imaginary ailments has been as scientifically unsound as their methods of treatment have been inefficacious. I teach my students that there is no such thing as an imaginary pain or illness. If a patient has a pain or other symptom it is an insult to his or her intelligence even to suggest the reverse. His imagination is not at fault in regard to the existence of the pain, but where his imagination is at fault is in his ideas as to the cause of it. If that attitude is suitably attacked the imaginary pain, so-called, will in most instances speedily disappear.

Dr Arthur J. Brock.—Psychotherapy consists of curative methods which address themselves directly to the mind (conscious or subconscious), and are destined to cure mild mental derangements. In these latter we often find factors of another class (*e.g.* nutritive factors, structural changes in the nervous system, intestinal absorption, perhaps eye-strain, floating kidney, etc.) playing a part, but far the most important are psychogenic factors. Psychotherapy is in itself a very wide subject, and there is a constant danger of our losing ourselves in its details. All the chief methods (psychoanalysis, hypnotism, re-education, etc.) have their place, and it is urgent that these should be orchestrated, and not allowed to drift into mental opposition. We must remember also that at bottom and etymologically "psychotherapy" merely means "treatment of human nature," and therefore it is no new thing, although nowadays becoming more "scientific." In the pre-war period (largely as a result of the teaching of the Germanic universities) the human factor was being forgotten, both in pathology and therapeutics. Hence the present rebound, especially in view of the pressing

problem of shell-shock, a condition so essentially psychical in origin.

But "shell-shock" is nothing new; it is merely an exaggeration of symptoms all doctors had met with before the war, and which are widespread among the civilian population at the present moment. It is important, therefore, to consider all these conditions together, and not to make an entity out of "shell-shock" (while recognising the provisional value of the term). The prevalence of these conditions cannot be entirely explained as due to excessive stress and strain: in a large proportion of cases the main factor was defective education, which had failed to produce a sufficiently resistant soil. The doctor is being forced now to make good the faults of the schoolmaster. In order, therefore, to deal with this subject more radically, more effectively—*i.e.*, in order to proceed increasingly from symptomatic treatment towards prophylaxis — it is highly desirable that the medical "re-educator" and the official educationist should now consider the subject together. I venture humbly to lay this suggestion before our Council.

Meeting III.—January 21, 1920

Emeritus-Professor F. M. Caird, *President, in the Chair*

I. Election of Members

R. Balfour Barnetson, M.D.Ed., 17 Abercorn Terrace, Portobello; James R. Drever, M.A., M.B., Ch.B. Glasg., 6 Coates Gardens; G. W. Galletly, M.B., C.M.Ed., 7 Bruntsfield Terrace; D. Charteris Graham, M.B., Ch.B.Ed., Selkirk; John Hunter, M.B., Ch.B. Ed., D.P.H.R.C.P.S.Ed., 41 Comely Bank Avenue; Duncan Lorimer, O.B.E., M.B., Ch.B.Ed., F.R.C.S. Ed., 2 Forbes Road; W. S. M'Laren, M.B., Ch.B.Ed., D.P.H., 52 Buccleuch Place; W. Menzies Menzies, M.B., Ch.B.Ed., 25 Castle Terrace; J. M'Nair Murray, M.B., Ch.B.Ed., 14 East Claremont Street; T. W. E. Ross, M.D.Ed., 31 Morningside Road; A. Nimmo Smith, M.B., Ch.B.Ed., 14 Lynedoch Place; Henry Yellowlees, O.B.E., M.B., Ch.B.Glasg., F.R.F.P.S.Glasg., 151 Morningside Drive, were elected Ordinary Members of the Society.

II. Original Communications

1. AN INQUIRY REGARDING THE AGE AND SEX INCIDENCE OF PERNICIOUS ANÆMIA

By John Eason, M.D.Ed., M.B., C.M., F.R.C.P.Ed.

We have been taught and have since observed, according to our opportunities, that cases of pernicious anæmia are most numerous about the middle period of life. Such is the current opinion of practitioners and the present-day teaching of authorities as shown by the following quotations taken at random :—

"Age has no great influence. Most cases appear between twenty and forty years of age, but even young children of less than five years have been seen with the malady."—H. Amory Hare, *Practice of Medicine.*

"It occurs most frequently after the twentieth year and between that year and the age of fifty."—Musser, *Medical Diagnosis.*

"The onset of the disease is most common in late middle life. It has been observed at all ages."—Wilson, *Medical Diagnosis.*

"Mostly during middle life."—Anders, *Practice of Medicine.*

"It affects middle-aged persons, but instances in children have been described."—Osler, *Practice of Medicine.*

"The disease is most common between thirty and fifty, though no age seems exempt. It is very rare in children. Cases in old age are much more common."—Gulland and Goodall, *Diseases of the Blood.*

The most recently published figures have not led to any fundamental change of view. Thus—

Herbert French states that "the great majority of the patients of the cancer age, that is to say, between thirty and sixty."—*Allbutt and Rolleston's System of Medicine.*

R. C. Cabot, however, says that "Pernicious anæmia is a disease of elderly people, its incidence being not far different from that of cancer. The more carefully one studies the cases, whether at the bedside or in the literature, the rarer does it appear to find a typical case of pernicious anæmia before the

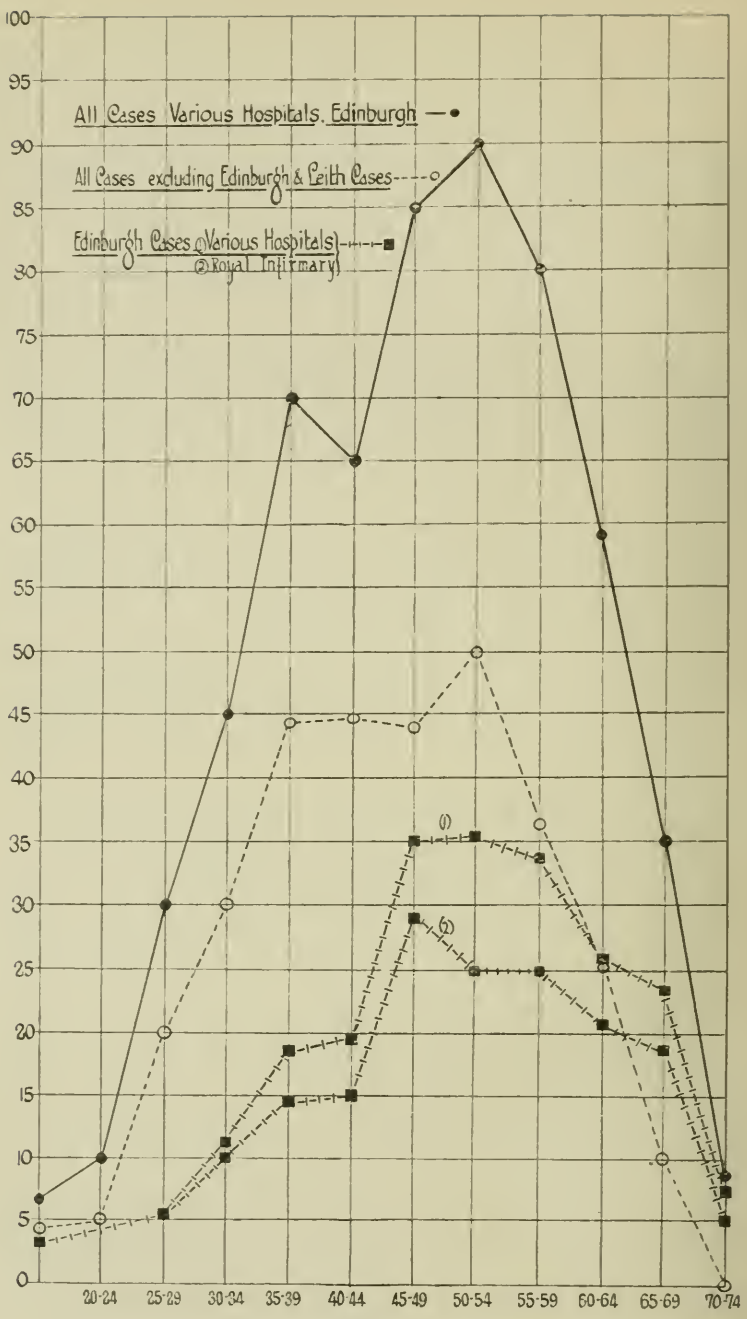

CHART I.

(See Legends for Charts at end of paper.)

thirty-fifth year. . . . More than half of all the cases collected occur between the fortieth and the sixtieth year. . . . The disease is between six and seven times as common after the thirty-fifth year as before it."

When examined in this simple manner, my own figures based on the combined observations in Edinburgh hospitals during the past twenty-one years, bear out the views expressed in such quotations as I have made but especially those of Cabot and of French. As Chart I. shows the quinquennium in which the largest numbers occur is fifty to fifty-four. As usually presented in the literature, the acceptance of this fact entails, I venture to maintain, firstly, that intrinsic or extrinsic deleterious forces, causing pernicious anæmia, are specially operating about the middle term of life; and secondly, that after this period of life has been traversed, these forces become less active. It is accordingly a matter of no little importance that the evidence hitherto founded on should be scrutinised. I hope to show that the manner of presenting the statistical data has been wrong and that the inferences above stated are from premises that should no longer be allowed.

I wish to submit that there are three chief defects in all published statistics on the age incidence of pernicious anæmia —two of these so flagrant that they are responsible for an entirely erroneous impression regarding (*a*) the age incidence and (*b*) probably regarding the essential nature of pernicious anæmia.

Reasons for questioning the validity of statistics of pernicious anæmia as hitherto published.

I. In examining the curves representing the numbers of cases admitted during successive quinquennial age periods, I have found that the curve of the Edinburgh cases shows a well-defined difference from the curve representing cases admitted to Edinburgh hospitals from the country or other towns. Further, the characteristics respectively of the Edinburgh and the "extra-mural" curves are shown consistently in the "total" as well as in the "male" and "female" cases.

These are shown in Charts I. II. and III. Taking Chart I. for example, a marked preponderance of extra-mural cases is shown up to the age of fifty-four. Thereafter there is a much more rapid diminution of the "extra-mural" than of Edinburgh

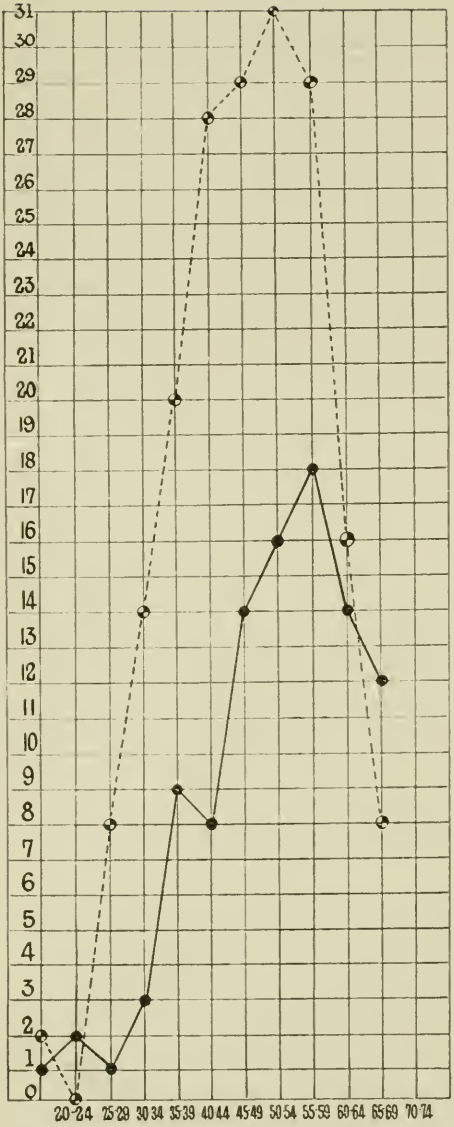

CHART II.—MALES. Quinquennial Numbers.

Edinburgh Cases ——●

Country Cases ----●

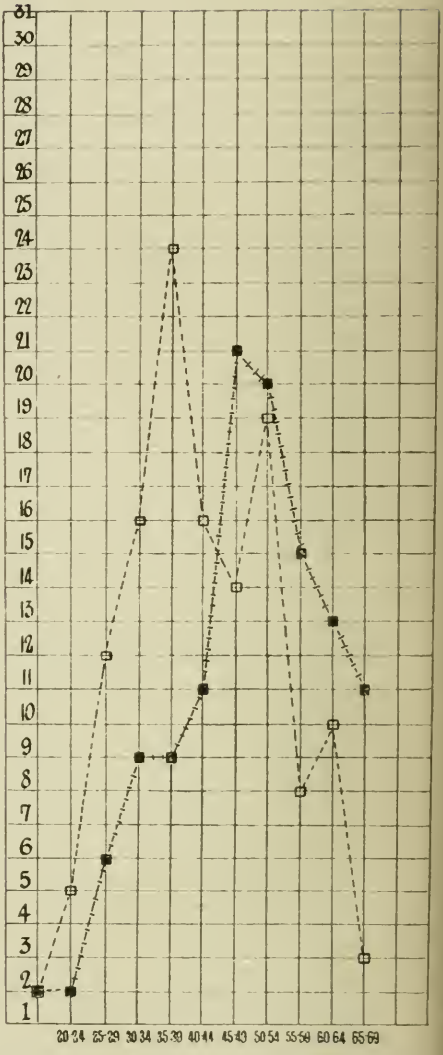

CHART III.—FEMALES. Quinquennial Numbers.

Edinburgh Cases -·-·-·-■

Country Cases - - - -□

cases with the result that in the last quinquennium of the statistics, the latter greatly preponderate. Chart II. representing male cases and Chart III. female cases, both show this characteristic statistical feature.

It is therefore important to determine which of these curves is the true curve—the extra-mural one or the city one.

Why is it that half the extra-mural cases are admitted by the forty-fifth year while this does not occur for the Edinburgh cases until the fifty-second year?

The circumstances that lead to the results shown in these divergent curves concern the patient, the patient's friends, and the family doctor.

(1) The elderly patients are less willing to leave home and travel to a distant hospital. They have become willing and able to realise and more disposed to resign themselves to the unfavourable prospect. The reasoning will doubtless have countless variations, but the ruling reason in most is the preference to die at or near home.

(2) The relatives realise that the life is a less valuable one and, rightly or wrongly, are readier to accept the illness as a terminal one. In the circumstances there is no insistent call made by them for specialised treatment.

(3) The combined effect of the interacting factors is to make the position of the medical attendant an infinitely more tolerable one, so that, on his part, the patient is not passed on to a hospital unless there are genuine medical reasons.

These and possibly other considerations operate to render the "extra-mural" curve abnormal and misleading.

This abnormality applies not merely to cases of pernicious anæmia but to all forms of medical diseases, as will be seen on referring to Chart IV.

I conclude from this that the only reliable basis for calculation is from the cases of pernicious anæmia among the local sick.

This is my first reason for questioning the reliability of published statistics.

II. The age incidence of pernicious anæmia has not hitherto been considered in relation to the age distribution of the population.

Remembering the orthodox view that pernicious anæmia is

most prone to attack individuals about the middle period of life, it is obviously of great importance to compare the number of cases at different age periods with the respective age-period populations.

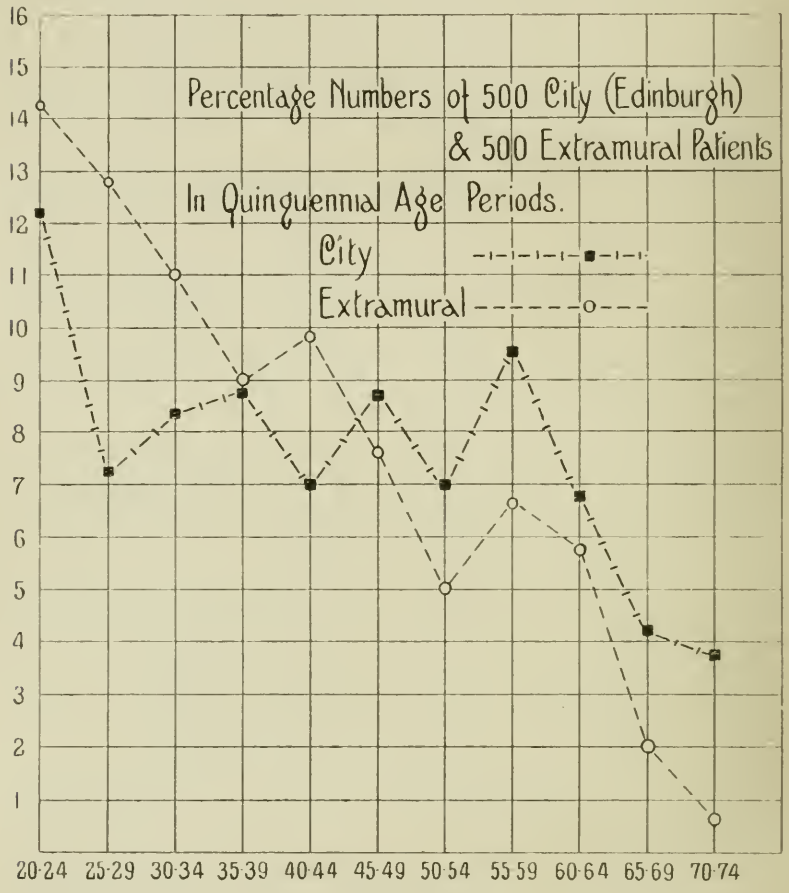

CHART IV.

In making the comparison, the extra-mural cases must be discarded, not only for the reason discussed under I. but also because one must confine the enquiry to an area whose population and population age-distribution is known.

In co-relating the incidence of hospital cases of pernicious anæmia to the population of the area, an absolute rate is

obviously not obtained. Although absolute measures of the frequency cannot be obtained, it is possible to draw legitimate deductions regarding the age incidence of the disease amongst the hospital classes, from the relative figures of the different age periods. Such deductions are valid if there is no reason to suppose that the ratios of the hospital classes of the population

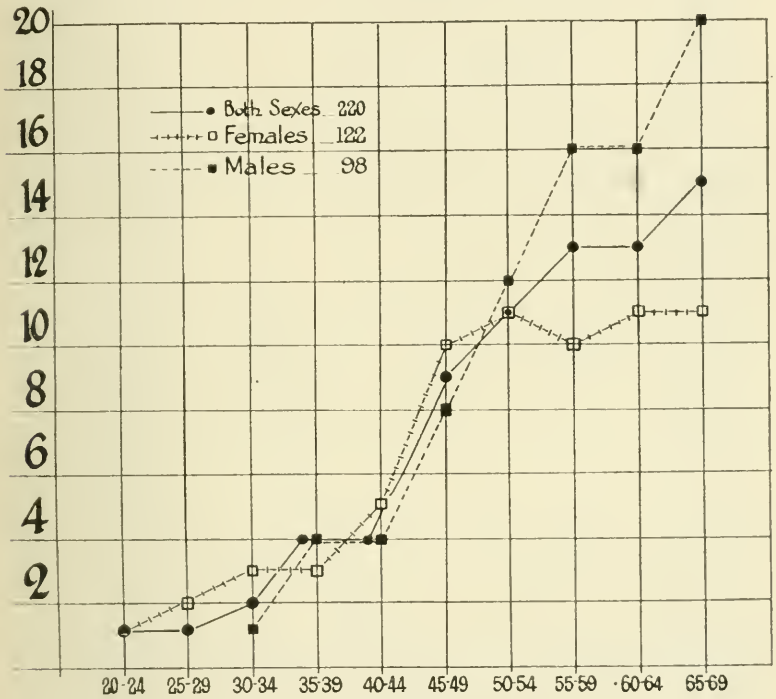

CHART V.—PERNICIOUS ANÆMIA.

220 Edinburgh Cases in Edinburgh Hospitals. Twenty-one years' Incidence Rate per 100,000 of Edinburgh Population.

to the other classes undergoes any important changes in the different age periods.

Although the deductions made from hospital statistics can be legitimately applied only to the incidence in hospital classes there is no reason known to the writer for supposing that the age incidence in other classes has special features.

III. The basis of ideal statistics must be pathological as well as clinical evidence.

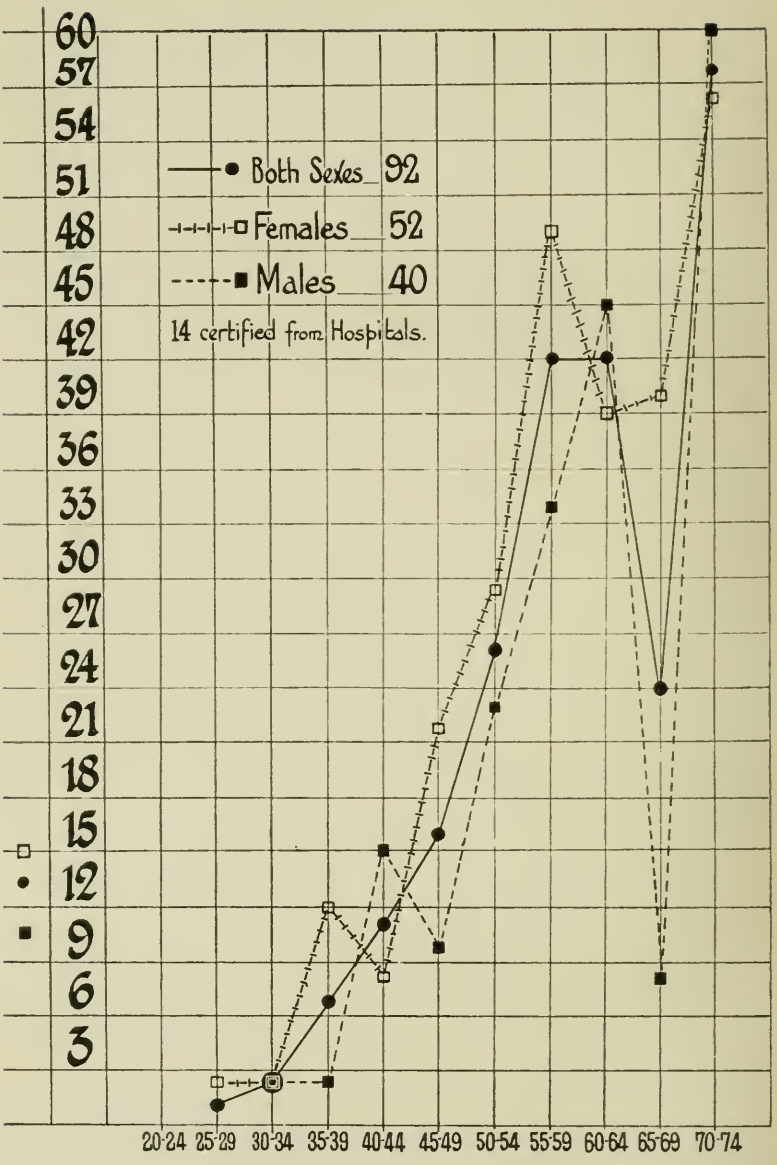

CHART VI.—PERNICIOUS ANÆMIA.

Death Rate per 100,000 of Population. Calculated from Deaths registered *October* to *December* 1919 in Scotland.

The difficulty here is that probably no single medical school can yet furnish large enough figures of consecutive cases on this basis. Compulsory post-mortem examination and the collected statistics of various medical schools would require to be available to provide adequate data on which more or less definite conclusions could be based.

In an analysis of cases admitted to Edinburgh hospitals during the past twenty-one years,

(*a*) I have discarded all but Edinburgh cases in the calculations that have been made.

(*b*) The age incidence and sex incidence of Edinburgh cases are shown in relation to the mean age distribution of the population, the rates being calculated at the department of the Registrar-General for Scotland, for which Dr James C. Dunlop is responsible.

(*c*) Chart V. shows the male, female, and total rates of incidence.

(*d*) The Registrar-General's returns for Scotland are given for a short period showing the ages at death certified as due to pernicious anæmia. The results are shown in Chart VI. as rates per 100,000 of the population at successive quinquennial age periods.

(*e*) The figures and rates shown in Charts V. and VI. have little weight as absolute case rates in Edinburgh or death rates in Scotland, but a few suggestive points may legitimately be deduced. These are—

(1) The Edinburgh Hospital cases show a maximum frequency at ages fifty-five to sixty-nine, while the Scottish death figures show a similar maximum at ages fifty-five to sixty-four and a second maximum at ages seventy to seventy-four. With the small numbers this correspondence is very close.

(2) The second maximum in the death figures may or may not be attributable to faulty certification and diagnosis, the term being used as applicable in cases of advanced anæmia in elderly people, perhaps without blood examination and perhaps in cases where the cause of anæmia—cancer or the like—was not recognised. There is an alternative possibility, viz., that the depression between the two maxima of the death figures is a false one owing to the brief period (three months) reviewed and the small numbers (92).

(3) In both the Edinburgh male "case" figures and the Scottish "death" figures, there are well-marked maximal frequencies at ages over sixty; in the "case" figures at ages sixty-five to sixty-nine and in the death figures at sixty to sixty-four and seventy to seventy-four, while the maximal frequencies in the female sex is not so well marked and somewhat younger. In the Scottish death figures there are female maxima at ages fifty-five to fifty-nine and seventy to seventy-four; in the Edinburgh hospitals case figures the female maximum is not well marked and there is a plateau between fifty and seventy.

Summary and Conclusions.

(1) Authorities have almost without exception stated that individuals about the middle period of life were specially prone to develop pernicious anæmia.

(2) Hypothesis and investigations based on hypothesis may proceed on futile lines if this view of the incidence is wrongly maintained.

(3) The evidence from a large general hospital of a medical school probably in all cases misleads unless cases of local sick from pernicious anæmia alone are the basis of conclusions.

(4) On this basis Edinburgh hospitals show the largest numbers between the ages of forty-five to fifty-nine.

(5) The rate in these hospitals per 100,000 of the population is highest between fifty-five and sixty-nine.

(6) The pernicious anæmia death rate figures for Scotland correspond very closely with the Edinburgh Hospital case figures.

(7) Until the age of fifty the rate of incidence inclines to be higher in the female than in the male. Thereafter the rate is definitely higher in males than in females.

(8) It appears that senility is a more important etiological factor than has hitherto been generally recognised.

(9) There appears to be an increasing liability to pernicious anæmia with advancing years.

I have pleasure in acknowledging the valuable help and advice kindly given by Dr James Crawford Dunlop, Superintendent of Statistics of H.M. General Register House, and Professor Lovell Gulland.

Description of Charts.

Chart I. Showing total cases of pernicious anæmia admitted to Edinburgh hospitals during the twenty-one years from 1898 to 1919. The base line shows quinquennial age periods and the vertical shows the number of cases admitted.

Chart II. Male cases of pernicious anæmia admitted to Edinburgh hospitals during the twenty-one years from 1898 to 1919.

Chart III. Female cases of pernicious anæmia admitted to Edinburgh hospitals during the twenty-one years from 1898 to 1919.

Chart IV. Shows the curves representing admission of all varieties of medical cases from the city of Edinburgh and from extra-mural sources, and the more rapid reduction of extra-mural cases from the forty-fifth year onward.

Chart V. These are Edinburgh hospitals incidence rates—not absolute measures—showing the age incidence per 100,000 of population for both sexes and for males and females. The base line shows quinquennial age periods and the figures in vertical column show rates.

Chart VI. The figures in vertical column indicate actual rates for a brief period, based on Registrar-General's return for Scotland. Fourteen of 92 cases were certified from hospitals. The majority of pernicious anæmia cases in Edinburgh hospitals and probably in other hospitals in Scotland die at home. It is probable that the majority of the 92 cases had been either hospital cases or consultation cases.

Discussion.

Dr John Thomson said that in his experience undoubted cases of pernicious anæmia were extremely rare in children, especially in infants; and that it was always very difficult and generally impossible to be sure of the diagnosis. Dr Robert Hutchison in his Goulstonian Lectures, "On Disorders of the Blood in Early Life" (March 1904), gave it as his opinion that only five of the cases which had appeared in medical literature as pernicious anæmia in childhood were even probably instances of that disease. Three of the patients in these cases were eleven years old, one five years and one nine months. The experience of the Children's Hospital here was to the effect that the disease was particularly rare in infants.

Dr Goodall said he would like to know whether Dr Eason had confined his enquiry to the Royal Infirmary or whether he has examined the statistics of the Royal Hospital for Sick Children. He noted that Dr Eason's curves showed the rarity of cases of pernicious anæmia in children. His own experience was that while the disease was very rare in children, he had seen most of the young cases in the first years of life. It was highly probable that in many instances a diagnosis of pernicious anæmia in infants might be missed unless the child was admitted to hospital, and admission to hospital was not so likely as in the case of adults. A striking point was the rarity of the disease between the earliest ages and thirty.

The fairly common occurrence of hereditary and family cases as well as the fact that many persons exposed to the known causes of pernicious anæmia and, presumably, to the more numerous unknown causes, strongly suggested that the bone marrow in certain persons might have a less power of resistance to toxins than that of others. The peculiar age incidence might be accounted for by periods of stress. There was firstly, the transition from intra-uterine to extra-uterine life, and, secondly, the period when vital processes began to be less robust. A man could easily do many things at thirty which he could not do at forty. He was not quite prepared to acquiesce in the view that Dr Eason seemed to suggest that cases would do just as well or as badly at home as in hospital or in the hands of a specialist. He was quite sure that many cases of pernicious anæmia suffered both from wrong diagnosis and from inadequate treatment.

Professor Gulland—I am very grateful to Dr Eason for his statistical study which has certainly placed the age incidence of pernicious anæmia on a very much sounder footing. I have always believed that the disease was associated with the degenerative period of life, but that it might be hastened in the cases occurring at earlier ages by many of the conditions and diseases which affect the marrow in one way or another, such as heredity, pregnancy, syphilis, malaria, etc. The disease, to my mind, is an exhaustion of the normoblastic function of the marrow and the resumption of megaloblastic activity. It is one of the great difficulties of such a study as that which Dr Eason

has given us, that there is probably a great deal of faulty certification, and that many cases of pernicious anæmia are missed. One of the principal reasons of this is, that as it belongs to the degenerative period it is often accompanied by other conditions, of which I may cite—cancer occasionally, diseases of the heart and vessels, chronic kidney mischief, myxœdema, gall-stones, etc., and these I have found very often bulk more largely — quite naturally — in the mind of the practitioner attending the case than the accompanying anæmia. The disease is certainly more common than it used to be, and probably more common than death certificates give us any idea of. This does not of course in any way detract from the value of the information which we have received to-night.

Dr James Ritchie expressed doubt as to whether Dr Eason's statistics represented the true frequency of the disease. It was interesting to learn from these tables that the disease was more one of decadence than had hitherto been believed. It was at times a very chronic one. He had occasionally to treat a lady whom Professor Gulland had seen with him in 1896 whose blood had at that time the well marked characters of pernicious anæmia. She was twice transfused by Mr now Sir Montagu Cotterill, with very marked benefit. Ten years later her blood was found by Professor Gulland to have still the characters of pernicious anæmia. She continues to be somewhat pallid. That lady has also, for the same long period, been the subject of hypothyroidism. Experience has taught her that to correct this condition she must take one 5 grain thyroid tabloid twice a week without intermissions.

2. SCURVY IN NORTH RUSSIA

(With Lantern Demonstrations)

By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P., Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh ; lately Consulting Physician North Russian Forces.

Historical:—Scurvy is a disease which has existed from early times. The first clear account of it is given by the Sire de Joinville, Seneschal of Louis IX., during the disastrous Crusade in the year 1249. He says, "We were attacked by the Army sickness,

which was such that our legs shrivelled up and became covered with black spots, and spots of the colour of earth like an old boot ; and in such of us as fell sick the gums became putrid with sores and no man recovered of that sickness, but all had to die. It was a sure sign of death when the nose began to bleed. . . . The sickness became much more severe throughout the camp, and the proud flesh in our men's mouths grew to such excess that the barber-surgeons were obliged to cut it off, to give them a chance of chewing their food or swallowing anything." As a result of the general weakness caused by scurvy throughout the army, the Saracens invaded the camp, killed great numbers of the Crusaders, and captured King Louis and his knights.[1]

In the sixteenth and seventeenth centuries scurvy was endemic in various parts of Europe, and in the eighteenth century it produced an enormous number of deaths among sailors serving in the Seven Years War and elsewhere. For example, in the voyage of Lord Anson round the world in 1740-44, after the ships had been at sea from 18th September 1740 to 7th March 1741, scurvy broke out with great severity among the crews. The most common symptoms were, in the words of the Rev. R. Walter, who edited Anson's papers : " Large discoloured spots, dispersed over the whole surface of the body, swelled legs, putrid gums, and, above all, an extraordinary lassitude of the whole body, especially after any exercise, however inconsiderable ; and this lassitude at last degenerates into a proneness to swoon, and even die, on the least exertion of strength, or even on the least motion." He adds that " alacrity of mind and sanguine thoughts were no contemptible preservatives from its fatal malignity." Further symptoms were " putrid fevers, pleurisies, the jaundice, and violent rheumatic pains, and sometimes it occasioned an obstinate costiveness, which was generally attended with a difficulty of breathing ; and this was esteemed the most deadly of all the scorbutic symptoms. At other times the whole body, but more especially the legs, were subject to ulcers of the worst kind, attended with rotten bones and such a luxuriancy of fungus flesh as yielded to no remedy." In one month (April 1741) no less than 43 men were buried from H.M.S. *Centurion*, and when Juan Fernandez was reached early in June, over half the crew had perished, and the remaining 210 men were so weak that the ship could hardly be brought to

anchor. Finally, 12 or 14 men died as they were being landed in the boats, but the remainder speedily recovered on the diet of vegetables, fresh fish, and goats' flesh, which the island provided.[2]

With regard to treatment, the use of fresh vegetables has long been known. Wirtzung, in the end of the sixteenth century, recommends fresh watercress, or horse-radish, or scurvy-grass (cochlearia) pounded up in wine or beer; fresh fruit and vegetables had been successfully used by the Dutch since 1564, and by Sir R. Hawkins in the *Dainty* in 1593; and John Woodhall, in *The Surgeon's Mate* (1636), mentions the virtues of lemon juice for scorbutics. James Lind, an Edinburgh graduate, and later Physician to Haslar Hospital, reintroduced the use of fresh vegetables and fruit, especially oranges and lemons, about 1754. As Lind, unfortunately, advocated the use at sea of *preserved* orange and lemon juice, which failed in the hands of the famous Captain Cook on his voyage to the southern hemisphere in 1773-74, this again went out of favour.[3] Sir Gilbert Blane, as head of the Navy Medical Board in 1795, made *fresh* lemon juice an essential part of the naval dietary, with the result that within a few years scurvy virtually disappeared from the Navy.[4] The curative properties of potatoes among civil prisoners suffering from scurvy were pointed out by Dr Baly about the middle of the nineteenth century. The preventive action of vegetables has been variously attributed to potash salts, to vegetable acids, and to their green colouring matter, but the essential factor seems to be some vital principle, since the same vegetable or fruit juice which is useful in a fresh state becomes inert after prolonged boiling or desiccation.

In North Russia at the present day scurvy is endemic every winter, and I propose to give my experience of some 600 cases of this disease which I saw while I was Consulting Physician to the Forces in that country during 1919. I saw a large number of cases under treatment in the Russian civil hospitals both at Murmansk and Archangel, and at the former place I was told by Dr Rabin, Port Medical Officer, that the favourite treatment is by the addition of two pints of fresh milk to the ordinary daily diet. The experiments of Chick, Hume, and Skelton, however, would seem to show that fresh milk is a food poor in the anti-scorbutic accessory factor.[5]

Among the British troops, scurvy of any severity was practically negligible. Four cases only were admitted to hospital and diagnosed, one in March, the other three in May 1919. It is probable, however, that the cases of debility with depression and discontent, which were found in considerable numbers at the end of the long winter, were due in part to a mild manifestation of this disease as well as to over-indulgence in alcohol. The rarity of scurvy among the Allied troops is largely to be explained by the inclusion in their dietary, from January 1919 onwards, of germinated peas and beans prepared as recommended by Dr Harriette Chick and Miss E. M. Hume.[6]

Causation:—In the Russian prisons at Archangel, scurvy appeared on a large scale in February 1919. Arrangements were made for admission of these scurvy cases to a special hospital established on Kegostroff Island in the spring. I am indebted to the admirable report of Captain A. J. Stevenson, R.A.M.C., the officer in charge of the hospital from June onwards, for details as to the relative incidence of various symptoms in 200 cases of which he made detailed histories.

The prison daily dietary had been since January 1918 till May 1919 as follows:—

Flour or biscuit	11 oz.
Rice, oatmeal, peas or beans	$7\frac{1}{4}$,,
Frozen or tinned meat, or salt-herring	$7\frac{1}{4}$,,
Bacon or pork	$1\frac{3}{4}$,,
Tea	$\frac{1}{4}$,,
Sugar	1 ,,
Salt	$\frac{3}{4}$,,
Lime Juice (preserved)	$\frac{1}{2}$,,

All the prisoners admitted to hospital complained of not having had sufficient to eat in prison. The amount, especially as regards carbohydrates, appears to be too low when one takes into account the excessive cold of the northern winter. The entire absence of fresh food is noticeable, and the preserved lime-juice is apparently of little use save as an alkali. Further, all the meat and vegetables were boiled for about three hours. As a result, scurvy appeared in the prisons with great severity during February and March 1919, and new cases developed throughout the spring. It was found that the average period during which

a man had been subjected to the above defective diet before he began to show signs of scurvy was 4·7 months. No doubt the lack of exercise, the crowded prison, the depression engendered by bad surroundings, and the darkness of the long Arctic winter nights all contributed to this result. It may be noted that in Anson's expedition of the eighteenth century, where the pre-scorbutic period can be fixed with equal definiteness, the duration of the unfavourable conditions before scurvy appeared was six months. It was observed that the concurrence of other diseases, such as typhus, typhoid, influenza, and pneumonia, shortened the pre-scorbutic period, so that some prisoners who had such illnesses developed scurvy from one to three months after entering the prison. In general, the severer forms of scurvy, showing marked swelling of the gums, large muscle-joint, or subperiosteal hæmorrhages and great debility, were seen in the younger men, and these amounted to about 27 per cent. of the cases. (Fig 1.)

Symptoms.—The first sign was very commonly a purpuric rash on the legs, and with this the patient complained of weakness, loss of energy, and depression of spirits. Swollen and bleeding gums, swelling of the ankles, and pains in various parts such as the head, the chest, or the legs, were also early symptoms.

Over 80 per cent. developed sooner or later swelling of the gums, which were tender, bled easily, and often ulcerated. Very frequently large, soft, tender, tumour-like swellings developed on the palatal aspect of the upper alveolar margin, and filled up the palatal arch so as to make chewing very difficult (Fig. 3). In about half the cases there was a condition of severe gingivitis or even pyorrhœa, the teeth being loose and surrounded by pockets of pus; but this condition passed off as the general symptoms abated.

About 86 per cent. showed well-marked hæmorrhages, and these were usually on places subjected to pressure like the trochanter, elbow, shoulder, just above the popliteal space, or on sites where a blow had been received. Deep hæmorrhages in the muscles were found in over 50 per cent. of cases, usually in the legs, and they were accompanied by pain, tenderness on pressure, gave a feeling of woody hardness to the hand, and caused limitation in the movements of the limb concerned.

Hæmorrhages into joints were somewhat difficult to distinguish with certainty from effusions of blood in the muscles and areolar tissues near the joint, but the actual joint (most commonly the knee) seemed to be affected in at least 10 per cent. of cases. Swelling of the joint, restricted movement, and tenderness when any attempt was made to move the affected limb were found, and this sign was the most persistent result of scurvy, the affected limb remaining stiff and contracted long after all blood had been absorbed and all other symptoms of scurvy had disappeared (Fig. 2). These joint affections were especially noted in the Russian civil hospitals. Subperiosteal hæmorrhages on the exposed parts of the ulna and tibia and on the back of the hand were noted in a few cases. When recovery was progressing, the muscle hæmorrhages were absorbed with striking rapidity, large black and hardened areas of 4 to 5 inches diameter resolving completely in two or three weeks. Hæmorrhages also occur in internal organs, and traces of partly absorbed blood were found on post-mortem examination beneath the parietal peritoneum, inside the bowel, into the pleura, in the meninges, and in the lung. In two cases there was bleeding from the bowel, in two from the urinary passages, and one had a cerebral hæmorrhage. When the hæmorrhage infiltrated the skin over a bony prominence like the trochanter or elbow or shin, or if any wound of such a devitalised area took place, an ulcer with raised edges was apt to form and to be very slow in healing.

The heart was always feeble, and in a considerable number of cases functional murmurs were audible. In cases where a post-mortem examination was performed, the cardiac muscle showed a striking degree of brown atrophy with great reduction in size of the ventricles. This and the large effusions sometimes found in the pleural cavities constitute the great risk for severe cases of scurvy, in which sudden death is very liable to occur. The blood-vessels in sections which were examined by Captain Stevenson showed no obvious changes.

The blood naturally attracted interest. Anæmia and great muscular wasting were obvious features of the severer cases, and there was a great deal of brownish pigmentation in the skin of dependent parts even where there had been no large hæmorrhages. A careful microscopic examination of the blood

FIG. 1.

Large subcutaneous and muscle hæmorrhage right thigh and leg.

FIG. 2.

Small cutaneous hæmorrhages ; and contracture following hæmorrhage into right knee.

FIG. 3.

Scurvy gums with tumour-like palatal swellings.

[*Face page* 64.

was made by Captain Stevenson in fifty cases of average severity, and the following table shows the average figures obtained by him :—

Red Cells	4,080,000	Polymorphs	45 p/c.
White Cells	7,510	Large lymphocytes	20 „
Hæmoglobin	55 p/c.	Small lymphocytes	29 „
Colour Index	·68	Eosinophiles	4 „
		Mononuclears	2 „

The characters were therefore those of a secondary anæmia with lymphocytosis. The coagulation time (average three and a half minutes) was not appreciably altered, and no special tendency to hæmorrhage from superficial wounds was noticed. There was slight diminution of the blood alkalinity (by Van Slyke's method).

With regard to the urine there was little abnormality. Albuminuria was observed five times only. In four cases only out of fifty was the urine alkaline. Hæmaturia was noted in three cases, one of these (a British soldier) having acute nephritis as well as symptoms of scurvy. No tube casts were found in any other cases.

Diagnosis.—The well-marked case is easy to diagnose by means of the hæmorrhages, the condition of the gums, and the general weakness and deterioration of health. But it is probable that isolated cases of less severity are often missed and regarded as debility of unknown origin, anæmia, rheumatic purpura, etc. In the present outbreak of scurvy, and probably in others, some cases which were regarded as typhus fever seemed afterwards to have been a combination of scurvy with one of the typhoid group, the rash of typhus and of scurvy being at first practically indistinguishable save for the fact that the minute scurvy hæmorrhages occur mainly on the legs and persist without fading for several weeks. Cases of mental depression and unexplained cardiac weakness with œdema and effusions into the serous cavities, when associated with a history of defective diet, should lead to a careful examination of the gums for swelling and of the legs for hæmorrhages. I have frequently seen cases in Scotland, especially in patients from mining districts, with a history of defective nutrition, which appeared to be cases of minor scurvy. These are very apt

to pass through hospital unrecognised and diagnosed as "anæmia," "debility," "purpura," unexplained "hæmorrhage," etc.

Treatment.—This falls under the three heads of (*a*) preventive treatment; (*b*) curative treatment; and (*c*) treatment of symptoms.

(*a*) *Preventive.*—Want of exercise, low temperature, depressing circumstances, and the occurrence of infectious diseases, undoubtedly predispose to the onset of scurvy, but the determining factor appears to be certain dietetic defects. The defect is supplied by fresh fruit, fresh milk, fresh meat, potatoes, and green vegetables such as cabbage, which is specially favoured by the people of North Russia. When scurvy occurs, however, these articles are usually scarce or unobtainable, and the simplest effective method is to issue a ration of germinated peas or beans (5 to 8 ounces dry per diem). For germination the dry peas or beans are steeped in water for twenty-four to forty-eight hours, depending on the hardness, until the embryonic root begins to sprout; thereafter they are spread on a damp cloth and covered by another wet cloth for a further period of thirty-six hours or thereabout till the sprout is about half an inch long. They must then be lightly boiled with milk or water for a period not exceeding half an hour. Beans are much more difficult to soften and germinate than peas, and therefore less suitable than the latter. Lemons (4 ounces) or fresh lime-juice (1 ounce) are invaluable if obtainable, but the experience of the North Russian prisons, as well as the history of the subject, shows that lime-juice which has been preserved for several years is practically inert in preventing scurvy.

(*b*) *Curative.*—Among the Russians, milk, either fresh or soured by the action of the lactic acid bacilli naturally present in the atmosphere, is considered specially efficacious in treatment. The proved value of sour milk is interesting in connection with the habitual use by the Tartars of koumiss or kefir.

For purposes of comparison, forty-eight patients of about the same severity were taken at Kegostroff Hospital, divided into six groups of eight, lettered A, B, C, D, E and F, which were segregated from one another, and a different vitamine-containing food was added to the general diet of each group. The patients being under guard as prisoners, it was easy to ensure that the feeding conditions were faithfully adhered to

during the six weeks over which the test lasted. The general diet consisted of bread, 12 ounces; oatmeal, 2 ounces; fat, 1 ounce; frozen meat, 10 ounces, boiled for three hours; milk, 2 pints, boiled for one and a half hours; and ungerminated peas or beans, 8 ounces, boiled for three hours. For the purpose of the test each group of eight had this diet varied in a different particular. Thus to the diet of group A was added the juice squeezed from 4 ounces of fresh lemon; group B received 8 ounces of germinated peas, lightly boiled, instead of the same quantity of ungerminated peas; group C received 8 ounces of germinated instead of ungerminated beans; group D received 10 ounces of fresh underdone meat instead of well-boiled frozen meat; group E had an addition of 8 ounces tinned fruit; and for group F, 2 pints of unboiled soured milk replaced the well-boiled milk of the other groups.

After six weeks, improvement had occurred in all six groups. The improvement was judged both by general well-being and more precisely by the increase that had occurred in body-weight. Group F (soured milk) showed most marked improvement, having added over 14 per cent. to the original body-weight; groups D (fresh meat) and A (lemon-juice) came next with an addition of between 10 and 11 per cent. each; group B (germinated peas) put on over 7 per cent.; and groups E (tinned fruit) and C (germinated beans) had an accession of between 6 and 7 per cent. each. The germinated beans had a tendency to cause diarrhœa, probably by their hardness and indigestibility; hence, no doubt, their lowness in the scale.

(c) *Treatment of Symptoms.*—Mouth-washes of alum or of hydrogen peroxide were given to cleanse the mouth, and the gums were painted with salicylate of soda dissolved in alcohol or with tincture of iodine. For the absorption of the hæmorrhages in the early stages, painting with tincture of iodine, and later massage combined with hot water or vapour baths, were used. The contractures of the limbs often required prolonged treatment by massage and oil inunction. Tonics of iron, arsenic, and strychnine were necessary to improve the appetite and the general health. Ulcers were treated by mild antiseptic dressings.

Summary.—Scurvy is endemic in North Russia, and breaks out every year towards the end of the winter among the poorer classes of the population.

While various factors predispose to its occurrence, the determining condition is a vitamine-deficient diet taken over a period of four to six months. The onset is hastened by intercurrent infectious disease and other devitalising influences.

If fresh meat and fresh vegetables be scarce, the simplest anti-scorbutic diet consists of germinated peas and beans, lightly cooked. Lime-juice which had been preserved and kept a long time was found to have little, if any, value in the prevention of scurvy.

Among the additions to the diet of prisoners suffering from scurvy, which were found to be of greatest curative efficacy, came in order of value—soured milk, fresh meat, fresh lemon-juice, germinated peas, tinned fruit, and germinated beans.

Cases of scurvy recover with great rapidity in favourable circumstances and with proper diet; almost every case loses all symptoms within one month, except as regards the contractures produced by the hæmorrhages, which may require prolonged treatment.

The chief danger is from sudden failure of the heart, which undergoes brown atrophy in the general wasting and may be embarrassed by excessive pleural effusions.

REFERENCES.—[1] *St Louis, King of France*, by the Sire de Joinville, trans. by James Hutton, Cambridge, 1910. [2] *A Voyage Round the World*, by George Anson, Esq., compiled by Richard Walter, M.A., Edinburgh, 1776. [3] Rolleston in *Journal of the Royal Naval Medical Service*, 1915, p. 181. [4] *Ibid.*, 1916, p. 72. [5] *Biochemical Journal*, vol. xii., June 1918, p. 131. [6] *Medical Research Committee's Report*, No. 38.

3. PERFORATED GASTRIC AND DUODENAL ULCER—NINETY CASES.

By J. W. STRUTHERS, F.R.C.S., Assistant Surgeon, Royal Infirmary, and Surgeon to Leith Hospital.

WITHIN the last twenty-five years the frequency of perforation of gastric and duodenal ulcers as a cause of peritonitis has come to be generally recognised. Several papers on perforation peritonitis have been read before the Society, the earlier and more important being those by Prof. Caird and Mr Miles. Thanks largely to their work and writing, the clinical features

of the condition and the necessity for its immediate treatment by operation are now well known in the area from which the Royal Infirmary and other hospitals in the neighbourhood draw their patients. Cases are diagnosed and sent for treatment as early as may be, and it is probable that few go unrecognised. In the late nineties a case of perforated duodenal ulcer was a rarity; now such cases might be described as among the commonplaces of emergency work, and seem to be increasing rather than diminishing in number.

I have notes of ninety cases of perforated ulcers, seventy-two duodenal and eighteen gastric. Some of my earlier gastric cases are not included because I have no record of them, so that the disproportion in the relative frequency of gastric and duodenal perforation is not really so great as the figures recorded seem to show.

It is not my present intention to analyse these cases in detail. I wish chiefly to emphasise their number. My experience does not, I take it, differ materially from that of my colleagues, and it indicates that these cases are common—far too common. While their absolute frequency is therefore considerable, their relative frequency to all cases of gastric and duodenal ulcer cannot be determined, as there are no statistics available to allow even an approximately accurate estimate to be made. As far as my own experience goes, I may say that I have, during my period of association with the Royal Infirmary and Leith Hospital, operated on and seen operated on a greater number of perforated ulcers than of ulcer cases before perforation or other dangerous complication has occurred.

The mortality attending perforation is and must be high. Deaths are nearly all due to delay, unavoidable for one reason or another, in carrying out operation after perforation takes place. The operative treatment is simple but apparently incapable of modification which will enable us to deal successfully with widespread contamination of the peritoneum incidental to delay in carrying it out. Twenty of my own ninety cases died. The general mortality rate is at least 20 to 25 per cent., and there seems no prospect of any material improvement in this death rate under present conditions. One important fact in relation to this may be recalled in passing, namely,

that there is no sign or symptom which indicates that perforation is impending. It is impossible to tell in what cases and when perforation is likely to occur.

As matters stand at present, the situation may be regarded as stabilised in this respect, that unless cases of gastric and duodenal ulcer are submitted to surgical treatment more often and earlier than has been customary, perforation with its attendant dangers and heavy mortality will remain frequent. Other disastrous end results of ulceration, such as pyloric and duodenal stenosis, hour-glass stomach and carcinoma, must also be reckoned in the count against the present methods of treating so-called simple ulcer of the stomach and duodenum.

It seems to me, therefore, that a discussion of the indications for the operative treatment of ulcer would be helpful, to determine whether we must continue to accept the present number of tragic end results as inevitable or whether the earlier adoption of surgical treatment is not possible in order to prevent much suffering and save many lives.

On analysing the histories of the ninety cases of perforation I have treated I find that fifty-four of them had suffered from intermittent or constant dyspepsia of an aggravated type for long periods, the most obvious and important symptom being pain after food. Without entering into a detailed consideration of their symptoms it may be said that their degree and persistence plainly indicated an organic lesion, an ulcer, as their cause. Treatment by dieting, drugs, and rest in bed had been tried in these cases, usually with partial and temporary success, sometimes in hospital but mostly in the patients' own homes.

Of the remaining thirty-six cases some were examples of rapidly progressing ulcers in which perforation was the first symptom of trouble. The remainder gave histories of relatively minor disturbance, mostly so mild that they had not thought it worth while to apply for treatment.

While eliciting the histories of the fifty-four patients who suffered from severe dyspepsia, it has seemed to me that they were, almost without exception, cases in which early surgical treatment might reasonably have been adopted. They were mostly men belonging to the industrial class, between 20 and 55 years of age, and able-bodied apart from their dyspeptic

symptoms. In all, the previous treatment carried out had been of a palliative character, and surgical aid was only called in when the final catastrophe of perforation took place. As has been pointed out, the great majority were cases of duodenal ulcer, and, as we know, the surgical treatment of duodenal ulcer is eminently satisfactory. In seeking an answer to the question as to why these patients had not been sent to the surgeon sooner, one feels driven to enquire of one's medical colleagues what they regard as indications for surgical intervention in cases of chronic duodenal and gastric ulcer.

On turning to the reports of the Royal Infirmary for the years 1913-14, the latest available, I find that there were in the two years, 147 cases of gastric and 63 cases of duodenal ulcer admitted to the medical side, 210 cases altogether. Of these, 31 cases of gastric and 23 cases of duodenal ulcer were sent to the surgical side, 54 out of 210. In only a fourth of the cases, then, was surgical treatment deemed necessary. Without laying too much stress on these figures, they seem to suggest that the majority at least of gastric and duodenal ulcers are regarded as curable by non-operative measures. Forced as we are on the surgical side to deal with so many unfortunate end results of ulceration, it is difficult to resist the suspicion that medical treatment too often results in palliation which is mistaken for cure.

Is it going too far to suggest that in cases of gastric and duodenal ulcer which do not yield promptly and permanently to medical treatment, the patients should be submitted to operative treatment at an early stage of their malady instead of being allowed to drag on until, desperately ill with perforation peritonitis or as dyspeptic wrecks, they are sent to the surgeon to do the best he can for them under a heavy handicap.

Discussion.

Mr Wilkie expressed himself in agreement with Mr Struthers' views. He pointed out the diversity in the statistics of individual surgeons. Thus in Mr Struthers' series 80 per cent. of the cases were duodenal perforations whilst in his own series of 37 cases barely 50 per cent. were duodenal. Another point was the higher mortality amongst the gastric cases.

Whilst he had had seven deaths in 19 gastric perforations there were no deaths in 18 duodenal cases.

There appeared to be a curious discrepancy between the opinions of the physicians and the surgeons in regard to the efficacy of the surgical treatment of chronic gastric and duodenal ulcers. In his experience the operation of gastro-enterostomy was attended with eminently satisfactory results. Apparently many physicians and some practitioners had now come to doubt its value. Surely this was a matter in which a careful statistical enquiry was urgently called for. If these unfortunate results, on which Dr Ritchie laid such stress, occurred in cases where a definite organic lesion had been found at operation it was well that it should be known, but it was contrary to the experience of most surgeons in Edinburgh and elsewhere. Unfortunate results had certainly followed gastro-enterostomy in quite a considerable number of cases, but on investigation it would usually be found that in these cases no definite organic lesion in the pyloro-duodenal region had been seen at the operation. Many of these were cases of reflex gastric disorder, for which a short-circuiting operation should never have been performed.

Dr W. T. Ritchie, while supporting the plea for the earlier surgical treatment of many cases, did not consider this was needed for all. It was well known that under medical treatment alone many cases presenting acute symptoms made an uninterrupted recovery, and thereafter remained well for years. Consequently medical treatment was often curative, and not merely palliative as had been suggested. But apart altogether from the risk of perforation, which was a comparatively rare complication and one which was often preceded by only trivial symptoms, cases in whom symptoms recurred and all who presented signs of pyloric stenosis should be referred to a surgeon. Yet there are cases with recurrent symptoms, including recent hæmatemesis and melæna, in whom no ulcer is detected at the time of operation, and who make a satisfactory recovery although no gastro-enterostomy is performed. Hour-glass contraction of the stomach, as seen on the X-ray screen, was not in itself evidence of an ulcer, nor was it an indication for surgical treatment, as the condition may be due solely to spasm, neither a contraction nor an ulcer being found at the

operation. He was unable to concur with the opinion that the surgical treatment of duodenal ulcer was always eminently satisfactory. In many patients surgical treatment did effect a complete and lasting cure; in others the immediate results were most satisfactory, but in not a few the relief was only temporary, for subsequently they again suffered from intractable symptoms of a chronic ulcer.

I am quite in accord with Mr Struthers that cases of ulcer of the stomach or duodenum, which have resisted medical treatment, should be investigated by a surgeon with a view to operation.

Unfortunately, many cases by the time they reach the surgeon are far advanced, and exceedingly difficult operations have to be performed for adhesions to various adjacent organs.

Diagnosis by X-ray cannot be entirely relied on. One of the most beautiful examples of hour-glass contraction was present in a patient who had a perfectly healthy stomach, but stricture of the small intestine high up. The first bismuth meal had accumulated above the stricture, and the second bismuth meal lying in the stomach, produced the appearance of hour-glass contraction.

The physicians who talk of the recurrence of symptoms following surgical interference, may of course have to do with cases of reflex dyspepsia, most usually associated with the appendix, and twice during the last year I have had to operate on people who had had gastro-enterostomy performed, for appendix dyspepsia.

Dr Goodall said that he had been impressed by Mr Struthers' figures. If rupture were really a common complication and the surgeon could prevent its occurrence then there seemed little more to be said, and all such ulcers must be regarded as surgical conditions. If rupture were not a very common condition, the physician was in a difficulty in recommending cases for surgical treatment, since the results of gastro-enterostomy were so uncertain. Some cases did extremely well but there were cases, by no means uncommon, whose subjective symptoms and sometimes objective symptoms were greatly aggravated after gastro-enterostomy and they were exceedingly difficult cases to treat.

Meeting IV.—February 4, 1920

Emeritus-Professor F. M. CAIRD, *President, in the Chair*

I. ELECTION OF MEMBERS

David Oswald Fairweather, M.B., Ch.B. Ed., 9 Ardmillan Terrace; Legh R. H. P. Marshall, O.B.E., M.D. Ed., Peebles; John Lewis Owen, M.B., Ch.B. Ed., D.P.H., 36 Inverleith Row; E. G. C. Price, M.B., Ch.B. Ed., 13 Alva Street, were elected Ordinary Members of the Society.

II. ORIGINAL COMMUNICATIONS

1. ENCEPHALITIS LETHARGICA (EPIDEMIC ENCEPHALITIS)

By EDWIN BRAMWELL, M.D., F.R.C.P. Edin., F.R.C.P. Lond., F.R.S.E.

With a Note on

POST-MORTEM FINDINGS IN A SERIES OF CASES OF ENCEPHALITIS

(With Lantern Demonstration)

By JAMES MILLER, M.D., F.R.C.P. Edin.

THERE is an especial fascination to the clinician attaching to a disorder which presents no single distinctive feature, which may simulate, or be simulated by, a large number of other affections, and in the recognition of which cytological, bacteriological, and chemical procedures have hitherto failed to afford any positive assistance. I may remind you that in the spring of 1917 von Economo[5] directed attention to a "new disease,"* cases of which were occurring in Vienna and its neighbourhood; that in the early spring of 1918 Netter[18] observed cases with a corresponding symptomatology in Paris; that in April of the same year Wilfred Harris[9] and Arthur J. Hall[7] simultaneously reported the presence in England of cases which presented

* F. G. Crookshank[4a] has adduced evidence from the older medical literature, which suggests that epidemics of encephalitis have occurred from time to time during the past 450 years.

similar features; and that Bassoe[1] was the first to report cases of the disease in the United States in March 1919. No doubt you will remember the general interest evoked in the public press by the suggestion that these cases might be attributable to the *Bacillus botulinus*—a suggestion which was before long proved to be incorrect. Crookshank,[4] Melland,[16] Kinnier Wilson,[24] Farquhar Buzzard,[3] S. P. James,[10] James McIntosh,[12] A. S. MacNalty,[13] R. J. Reece,[20] and Marinesco,[15] among others in this country, have contributed to the literature; numerous isolated case records have been reported, and the subject has been discussed at several sectional meetings of the Royal Society of Medicine, while in October 1918, a Blue Book, entitled "Encephalitis Lethargica—an Enquiry into an Obscure Disease," was issued by the Local Government Board. Nevertheless, I am satisfied that cases of encephalitis lethargica are only exceptionally recognised, and this is not surprising for several reasons. In the first place, the clinical pictures presented, even by typical cases, are very varied; again, a variety of different titles were employed with which to designate the earlier case reports; while, further, during 1918, when the majority of the contributions to the literature of encephalitis lethargica were appearing in the medical journals, practitioners had but little opportunity or leisure for literary study. This being so, I feel that no apology is called for as an introduction to the following remarks, which are based upon a considerable experience of the disease.

Evolution of Conception of Encephalitis.

As a preface to subsequent considerations, it is interesting to trace what I may term the steps in evolution, both eliminative and constructive, which have led up to the present day pathological and clinical conceptions of non-suppurative encephalitis.

The current view regarding encephalitis in the early "forties" of last century may be illustrated by reference to a remarkable work, "The Diseases and Derangements of the Nervous System," published in 1841 by Marshall Hall, a name to be remembered as one of the most distinguished in the history of British neurology. This authority, under the term "encephalitis," included not only meningitis, abscess of the brain, and, indeed, all inflammatory processes within the cranium, but in addition

the cerebral softenings, the relation of which to interference with the blood-supply was at that time not recognised. Although Marshall Hall enumerates a number of clinical features which are met with as a sequel to the various processes just mentioned, the latter were not differentiated pathologically, and a diagnosis during life was consequently impossible.

Three names stand pre-eminent in relation to the process of elimination which has led up to the present-day conception. Thus Virchow, who in 1846 published his famous work on embolism and thrombosis, may be said to have paved the way to the discovery that the great majority of the softenings of the brain substance, which had hitherto been attributed to an inflammatory process, were in reality a consequence of vascular occlusion. Again, Quincke, by the introduction of lumbar puncture in 1891, opened up a new field in the study of the cerebro-spinal fluid, and thereby effected a great advance in the diagnosis and differential diagnosis of meningitis; while Sir William Macewen, who in 1893 produced his well-known work upon "The Pyogenic Diseases of the Nervous System," has probably done more than any other observer to further our knowledge of suppurative encephalitis or abscess of the brain.

Constructive evolution dates from the early "eighties" of last century. Four groups of non-suppurative encephalitis have, I think I may say, been recognised by clinicians in the past, and to these I shall now briefly allude. Wernicke, in 1881, recorded three cases of encephalitis which were characterised clinically by an ophthalmoplegia of more or less sudden onset and pathologically by an acute hæmorrhagic inflammation of the grey matter of the floor of the third and fourth ventricles and in the neighbourhood of the aqueduct of Sylvius. Alcohol appeared to play a definite rôle in relation to these cases. Since the symptoms were purely motor, and since the process was an inflammatory one which affected essentially the motor nuclei in the upper part of the brain stem, Wernicke compared the condition which is now often known by his name to acute poliomyelitis, and termed it superior hæmorrhagic polioencephalitis. The adoption of this nomenclature was perhaps unfortunate, since the two disorders, although they present an homologous pathological anatomy, are ætiologically and clinically distinct. Wernicke's superior polioencephalitis has

been, in the past at least, a condition of extreme rarity. Strümpell, in 1884, advanced the view that the cerebral palsies of childhood are for the most part dependent upon an encephalitis of the cortex of the brain, similar in its nature to the poliomyelitis of the spinal cord. Admitting the truth of the contention advanced by his critics that an inflammation limited to the cortex would not account for a widespread involvement of the white matter of the hemispheres with porencephaly, such as is observed in some of these cases, Strümpell abandoned the term polioencephalitis, which he had originally employed in this connexion, and in his later writings speaks of the encephalitis of childhood. There is some reason for believing that the encephalitis of Strümpell may be due to a specific organism, the nature of which has not, however, as yet been determined. The same observer appears to have been the first to describe an encephalitis with a cerebral localisation in the adult. Medin, the Swedish physician, who at the Berlin meeting of the International Medical Congress in 1890 reported an outbreak of poliomyelitis in Stockholm, demonstrated that cerebral palsies are far from uncommon during epidemics of poliomyelitis. The dependence of these symptoms upon an encephalitis, which must obviously be due to the same specific virus as poliomyelitis, has since been proved anatomically by Wickman and others. The occasional occurrence of an encephalitis as a sequel to one or other of the infective fevers is repeatedly referred to in the literature. It would seem, to judge by the number of infective maladies in the course of which an encephalitis has been noted, that a great variety of different organisms are capable of producing an inflammation of the brain, although the combination of circumstances which permits of this must be one of extreme rarity.

I shall now direct your attention to encephalitis lethargica *

* The desirability of retaining the term "encephalitis lethargica," which was originally introduced by Economo[5] and adopted by the Local Government Board,[13] has been called in question. Kinnier Wilson[21] objects to the term on the ground that it is illegitimate to apply a clinical adjective to a pathological substantive. A. J. Hall advocates "sleeping palsy" for popular use, since it is less cumbersome and at the same time expressive, distinctive, and non-committal. Exception may, indeed, be taken to the adjective "lethargica," since lethargy, although a characteristic feature, is not perhaps a constant accompaniment of the pathological process. There

—the type of encephalitis which has been so prevalent of late—with particular reference to the clinical features these cases present and the many problems in diagnosis to which they give rise. I find that I have notes of 57 cases seen since March 1918, in which I have made a definite diagnosis of encephalitis lethargica or epidemic encephalitis. An opportunity of corroborating the diagnosis after death was, it is true, only afforded on three occasions, a circumstance accounted for by the fact that the great majority of the cases were seen in consulting practice, only four patients dying in hospital. The series above referred to includes, however, no case in which the nature of the condition appeared to be open to reasonable doubt.

The Characteristic Clinical Picture.

The *mode of onset* varies. As a rule, the symptoms develop gradually, and even in very severe cases it may be a few days or even a week or two before they become pronounced. Amongst the prominent earliest symptoms I have observed are the following, viz.: abnormal drowsiness, with a tendency to fall asleep when reading or working; diplopia; defective vision, consequent upon paresis of accommodation; a feeling of light-headedness; some loss of emotional control; pronounced constipation; difficulty in passing urine; and severe peripheral pains simulating a localised neuritis. In other cases no such prodromal period is observed. The patient may go to bed feeling in his usual health and wake next morning presenting well marked manifestations of the disease. Occasionally the onset is apoplectiform. Thus, three of my patients fell suddenly to the ground unconscious. A rise of temperature, usually accompanied by headache, an increase in the state of apathy, and sometimes vomiting, marks the true onset of the

are reasons for believing that lethargy may be a focal mid-brain manifestation, and it is quite possible that further pathological observation may demonstrate that the effects of the causal virus are at times confined to parts other than the brain stem This being so, it would appear to the writer to be inexpedient in the present state of knowledge to attempt to supersede the current nomenclature by a clinical appellation which in the near future may perhaps be replaced with advantage by a more appropriate ætiological terminology.

Physiognomy in a case of Lethargic Encephalitis.

[*Face page* 78

illness. Exceptionally, restlessness and, it may be, mental excitement are observed in place of the characteristic lethargy.

A recognition of the various modes of onset is necessary in relation to early diagnosis. I would recognise four groups of cases in this connexion :—

(*a*) An asthenic or somnolent type, to which the great majority belong.

(*b*) A meningitic type, to which A. J. Hall[7] especially has drawn attention.

(*c*) An apoplectiform type.

(*d*) A neuralgic type which is characterised by very severe pain referred to one or more extremities or to the head.

A typical severe case of encephalitis lethargica presents a striking physiognomy during the febrile stage.

The patient usually lies on his back, the eyes half closed ; the face may be flushed and covered with beads of perspiration (in three cases unilateral sweating and in two a conjunctivitis was observed). Often the patient will lie motionless for hours at a time without making any attempt to alter his position. He makes no complaint, he appears to take no interest in his surroundings, and yet there may be only a moderate degree of somnolence. Again, in other cases the patient, though oblivious to his surroundings, is in a restless state ; he mutters to himself or talks aloud. He is evidently disorientated, for his delirium refers to his daily occupation. Thus, one of my patients, a sergeant, was constantly drilling his men, another, a lawyer, giving instructions to his clerks, and a third, a business man, carrying on animated conversations by telephone. The lips are seen to move, and yet the face is often strikingly immobile and expressionless. There may, however, be some tremor and occasionally spasmodic twitchings of the facial muscles. From time to time the patient fumbles with the bedclothes, and an irregular tremor or spasmodic jerkings of the limbs may then be noticeable. The general appearance may, indeed, closely resemble that of a case of delirium tremens. Although the patient may appear to be in a state of semi-stupor, he will often, when addressed, awake from his somnolent condition or break off in the middle of his delirium and reply intelligently to questions put to him, although his responses are slow, his intonation monotonous, and his articulation often somewhat

indistinct. In two cases a complete disorientation, both as regards time and space, was noted. Pains in the limbs, when any attempt is made to move the patient, are not uncommonly complained of. Variations in the lethargic state, from a slight degree of somnolence to actual coma in severe cases, may be observed from time to time. Paradoxical as it may seem, sleeplessness is not infrequent. When the stupor is pronounced loss of control over the sphincters and difficulty in swallowing are observed.

Upon examination the temperature will generally be found to be slightly elevated if the patient is seen within the first few days of his illness (in my experience the temperature rarely rises above 101 or 102° unless towards the termination of a fatal case). The temperature usually falls in a few days, although it may remain elevated for two or three weeks, after which it is commonly subnormal. Exceptionally a slight rise of temperature, persisting for a day or two, is observed at a later date. The pulse-rate is somewhat accelerated and not infrequently out of proportion to the febrile disturbance. The tongue is usually very dry, and it may be coated. A moderate degree of neck rigidity, together with Kernig's sign, may be present, though both these phenomena are exceptional. In two or three cases I have observed a diffuse erythema, and in one case herpes labialis.

Focal nervous symptoms referable to the ocular muscles are of very frequent occurrence. Thus, bilateral ptosis, a divergent strabismus, some defect of the ocular movements, notably a paresis of the muscles supplied by the third nerves, nystagmus, inequality of the pupils, which may be widely dilated and usually respond sluggishly to light, and paresis of the ciliary muscles, with consequent impairment of vision due to defective accommodation, are often observed. Not infrequently, too, there is some paresis of the facial muscles, as a rule, though not always, bilateral, and amounting sometimes to a complete paralysis. Generalised weakness of the limbs, more accurately described as a profound asthenia than a paralysis, is the rule. Sometimes, however, a definite mono- or hemi-paresis is present. Katatonia is a common symptom when the somnolence is pronounced. The knee-jerks show no constant alteration; they may be exaggerated, while occasionally they are absent. The

plantar reflexes are usually of the flexor type, though exceptionally an extensor response can be elicited. Changes in the fundus oculi are exceptional, although in several cases I have seen engorgement of the veins, and in two cases in which the diagnosis was not absolutely certain, and which are not included in this series, an optic neuritis was present. I have met with no case in which there was a history of a fit. One patient exhibited pronounced maniacal excitement. Upon lumbar puncture a clear cerebro-spinal fluid, which is not under pressure, but which may contain a slight excess of cellular elements of the lymphocyte type, is usually obtained. In two cases of probable encephalitis lethargica, not included in this series, altered blood was withdrawn on lumbar puncture. As to the blood, my observations are in accord with those of Vaidya and of William Boyd[2a] that a leucocytosis is exceptional and, when present, of slight degree, while in four of my cases in which differential counts were made no definite abnormality was detected. In two cases sugar and in one case albumin and blood were present in the urine. Enlargement of the spleen was observed in no instance. Catarrhal symptoms referable to the respiratory tract are, in my experience, unusual; they certainly do not occupy a prominent place in the clinical picture.

Salient Clinical Features.

The salient clinical features of the common type of encephalitis lethargica may be conveniently classed in three groups as follows:—

(1) Febrile disturbance, which is met with almost invariably in the initial stages. Although as a rule slight in degree, and consequently apt to escape detection, this symptom is important in relation to diagnosis. Accompanying the fever certain general symptoms, such as headache and, less commonly, giddiness and vomiting, are often met with during the earlier days of the illness.

(2) A state of progressive somnolence, apathy, and lethargy, from which the affection derives its appropriate designation. This symptom, which is present in the great majority of cases, is associated with slow mental action, want of initiative, and when pronounced, as a rule with an occupational delirium.

(3) Symptoms referable to focal disturbances in the function of the nervous system, a consequence of the structural changes produced by the morbid process. These vary according to the region of the nervous system in which the lesion is situated or most pronounced. The frequency with which paresis of the ocular muscles, notably of those supplied by the third nerves (ptosis, strabismus, defective movements of the eyes, nystagmus, unequal and sluggish pupils, and defective accommodation), and paresis of the face are met with is explained by the fact that in the majority of cases the mesencephalon and pons are the special regions selected by the process.

Before proceeding to refer to exceptional types and to allude to certain problems of differential diagnosis I would emphasise two points. In the first place, let me again remind you of the various modes of onset to which I have referred and the early premonitory symptoms met with in certain cases; while, secondly, it is necessary that you should realise that, although the focal nervous symptoms commonly make their appearance in the initial stages of the illness, they sometimes continue to develop for two or three weeks; in other words, the local lesion may be progressive.

Diagnosis.

The above description is applicable to pronounced cases of what may be termed the characteristic mesencephalic type of the disease. All cases, however, do not present such a symptomatology; indeed, I know of no affection which manifests such a multiplicity of clinical pictures, and, consequently, offers so many difficulties in diagnosis. The symptomatology varies according to the mode of onset, the preponderance of general or focal manifestations, and the region of the brain affected by the lesion. Since encephalitis lethargica may closely resemble a number of different conditions, since no single symptom can be regarded as pathognomonic, and since pathological methods afford no help of a positive kind in its recognition, diagnosis by exclusion necessarily plays a prominent rôle, and the physician's general experience and clinical acumen may consequently be severely taxed.

As an aid to diagnosis it is convenient, as suggested by MacNalty[13] in his excellent article, to recognise a number of

clinical types, among which the following are illustrated by cases which have come under my observation.

(1) The common or mesencephalic type, to which the great majority of cases belong. This type is characterised, as has been mentioned, by febrile disturbance and by a state of apathy, somnolence, general lethargy, or even stupor associated with paresis of the ocular and facial musculature. The diagnosis here presents little difficulty.

(2) A type in which the lethargy, somnolence, and sometimes symptoms of meningeal irritation are pronounced, while focal nervous symptoms are either inconspicuous or absent. Cases of this kind are by no means infrequent. They are apt to be mistaken for a variety of other conditions, among which I would especially mention the following, which I have known to give rise to difficulty in diagnosis, viz.: cerebro-spinal fever, tuberculous meningitis, influenza, typhoid fever, cerebral arteriosclerosis, and uræmia.

(3) Cases which present striking focal symptoms referable to the mesencephalon (ophthalmoplegia, facial immobility, etc.), though the initial febrile disturbance has been so slight and evanescent that it has escaped notice, and the somnolence and lethargy are inconspicuous and overshadowed by the focal manifestations. In three cases of the kind which I have met with a diagnosis of intracranial tumour had been previously advanced by a competent observer. It is, indeed, very probable, as Nonne has suggested, that some of the reported instances of supposed intracranial neoplasm, in which the growth of the tumour had apparently become arrested, have been cases of encephalitis.

(4) An abortive type, illustrated by one of my cases, in which the symptoms, never pronounced, pass off more or less completely in the course of two or three weeks.

(5) A type which closely resembles paralysis agitans. The similarity which some cases of encephalitis lethargica present to paralysis agitans has been emphasised by Farquhar Buzzard.[3] Several such cases have come under my notice. The resemblance was particularly striking in the case of one patient, in whom the expressionless face, the monotonous voice, attitude and gait so closely resembled Parkinson's disease that, had no history of the illness been available, it would have been difficult

to differentiate between the two conditions. In another case, a rhythmic tremor confined to one arm presented features indistinguishable from that of paralysis agitans, while the immobility of the face emphasised the similarity. Here, again, a history of a febrile onset with diplopia, together with the subsequent course of the illness, placed the diagnosis beyond question. No doubt the phenomena met with in this type of the disease are to be explained by implication of the red nucleus or rubro-spinal tract.

(6) Cerebellar ataxia was a striking feature in one case in which the symptoms suggested the possibility of disseminated sclerosis, an alternative diagnosis which in two other instances was only dismissed after full consideration of all the facts. In a second case, in which recovery was eventually complete, the association of cerebellar symptoms, with somewhat severe headache and vomiting, raised the question of a tumour in this region of the brain.

(7) Progressive focal symptoms referable to the motor nuclei of the lower cranial nerves in the medulla, and unaccompanied by any general manifestations, were observed in one case in which the diagnosis between tumour and encephalitis remained doubtful until eventually determined by post-mortem examination. In distinguishing between tumour and encephalitis I would in passing remind you that the difficulty is accentuated by the fact that neoplasms situated in the brain stem are often unaccompanied by indications of increased intracranial pressure (headache, vomiting, and optic neuritis), while, further, the focal nervous symptoms in encephalitis lethargica may be progressive.

(8) A cerebral localisation was observed in three cases; in two of these hemiplegic symptoms, in the third a monoplegia, were, in my opinion, dependent upon an encephalitis. The diagnosis in two of these cases was based on the fact that there was a history of a definite febrile onset with ocular palsies, while in none of the three were there indications pointing to any other factor which might account for the paralysis. Recovery was complete in all, a fact which afforded corroborative evidence as to their nature.

When one remembers that encephalitis lethargica may commence with the suddenness of an apoplexy, as I have personally seen on three occasions, the difficulty in differentiat-

ing cases of the kind from cerebral hæmorrhage or occlusion of the cerebral vessels is at once apparent. The absence of signs of cardio-vascular disease and the exclusion of syphilis are matters of importance in this connexion, while the rarity of hæmorrhage into a glioma which has previously given rise to no symptoms renders such a possibility unlikely. Farquhar Buzzard [3] has described cases with hæmorrhage on the surface of the brain. Attention has been drawn to the fact that emotional disturbance is not infrequently observed in cases of encephalitis lethargica. In the absence of fever or of certain indications of an organic process an erroneous diagnosis of functional disease can be understood. I made this mistake in one case in which the temperature, which was normal at the time of my examination, rose two days later; the patient died within a week from symptoms which appeared to be undoubtedly due to an encephalitis.

The above remarks will serve to indicate the protean symptomatology of encephalitis lethargica and at the same time to illustrate some of the numerous difficulties which may arise in the diagnosis of this disease. A case may, indeed, present very different features, and consequently raise very different diagnostic problems, according as it is seen during the prodromal stage, in the febrile period, or at a later date when the general symptoms have largely passed off. In the great majority of the cases I have seen, encephalitis lethargica had not been previously suspected. Time and again a practitioner, when asking me to see a patient, has told me that he was quite at a loss as to the diagnosis, since the case I was to see presented features he had never previously met with.

Pathological Features.

Anatomical observation demonstrates that the affection under discussion is dependent upon an encephalitis which shows a special, though not invariable, predilection for the brain stem. Since Dr James Miller will review the morbid anatomy of the disease and narrate his personal observations, I do not propose to refer to this aspect of the subject. At the same time I should like in passing to make a brief reference to the correlation of the morbid anatomy and symptomatic features. Let me draw

your attention more particularly in this connexion to the infiltration of the tissues, and particularly to the infiltration of the walls of the blood-vessels in the affected region with cells of the lymphocyte type, to the œdema of the brain substance, to the small hæmorrhages which are occasionally observed, and to the neuroglial proliferation which is met with here and there.

The histological characters of the lesion indicate its infective nature and afford an adequate explanation of the associated febrile disturbance, while its distribution and anatomical features account for the frequently bilateral, though often asymmetrical, and usually incomplete, character of the pareses, the occasional variation in the intensity of the symptoms, and the fact that although in some cases the patient makes a complete recovery in others some permanent disability persists. The circumstance that the anatomical changes are confined to the mesencephalon and pons, or are, at any rate, usually more intense in these regions, is only what might be expected in view of the focal nervous symptoms which are most commonly met with.

The paresis of the oculo-motor, of the facial, and, it may be, of other cranial nerves, is evidently due to involvement either of their respective nuclei or of their nerve fibres as they traverse the substance of the brain. Nystagmus, which is so frequent, may be accounted for by interference with the function of the direct nerve-supply to the ocular muscles or to implication of the posterior longitudinal bundle. The not infrequent mask-like face and the tremor, which is sometimes met with, are doubtless to be explained by interference with the function of the red nucleus or rubro-spinal tract. Again, the cerebellar ataxia observed in two of my cases may be accounted for by implication of the cerebellar peduncles or the cerebellum itself, while the general asthenia may be explained by involvement of the motor nuclei in the spinal cord (?). It may be that the pains in the limbs and the tenderness of the muscles sometimes complained of are dependent upon changes in the peripheral nerves, although no pathological observations have so far been recorded in proof of this suggestion. Babinski's sign when present, and exaggeration of the knee-jerks, are obviously a consequence of interference with the efferent cortico-spinal tracts.

The mode of production of the lethargic state is less apparent.

Since headache is rarely severe and vomiting, when it occurs, is a transient symptom, since optic neuritis is seldom, if ever, met with, and since the cerebro-spinal fluid is not under pressure, it would seem that the state of lethargy is probably not dependent upon a general increase of intracranial pressure —a conclusion which is supported by post-mortem evidence. Again, a study of the literature would seem to indicate that generalised œdema of the brain is not a pronounced or constant feature. The question consequently arises, May the lethargic state possibly be explained by the focal lesion in the brain stem? The optic thalamus, as is well known, constitutes a receptive centre for all afferent stimuli, and the view has been advocated by MacNalty[13] that the lethargic state may be due to an interruption of the afferent stimuli passing to the thalamus. This hypothesis is an attractive one. The circumstances that in both sleeping sickness and basal syphilis perivascular infiltration is a prominent feature, and that in the former drowsiness is a constant, in the latter a not infrequent, symptom, are, I think, suggestive in this connexion. Further, I have seen more than one case in which I diagnosed an encephalitis of the cerebrum in which drowsiness was not, at any rate, a striking feature.

The specific cause of encephalitis is as yet unknown.

Von Wiesner,[23] working in association with von Economo, affirmed in 1917 that he had discovered a diplostreptococcus to which he attributed specific properties. This author's contentions have, however, been criticised by Kinnier Wilson[24] and others, and his deductions have not been accepted as conclusive. The careful bacteriological observations of McIntosh[12] were of a negative character. Marinesco[15] and da Fano and Ingleby[6] have described intracellular bodies which may possibly be of an organismal nature, but their observations demand further corroboration. James Miller investigated bacteriologically the cerebro-spinal fluid, blood, fæces, urine, and pharyngeal secretion in four of my cases, with a negative result in so far as he found no pathogenic organisms. Animal experiments carried out by McIntosh[12] and others have been of a negative kind. Recently, however, Strauss, Loewe and Hirshfeld[21] have affirmed that they have succeeded in producing an encephalitis experimentally. It has been suggested that the causal organism may obtain access by the nasal mucous membrane. One of my cases was

of special interest in this connexion, for the encephalitis developed while the patient was in hospital a few days after the removal of a nasal polypus. This man, who stated that he had had a purulent discharge from the nose for some time previously, was, it is interesting to note, proved by Dr Miller to be a meningococcal carrier.

General Ætiological Considerations.

Although no cases of encephalitis lethargica have, so far as I am aware, been hitherto reported from Scotland,* my experience suggests that the disease has probably been as prevalent north of the Tweed as in England and Wales. This statement is supported by figures extracted from the mortality returns from Scotland for the first three months of 1919, which Dr J. C. Dunlop, the Superintendent of Statistics, has kindly placed at my disposal.

According to these figures, "The total number of deaths certified as due to encephalitis during the first quarter of the year 1919 was 58; in the corresponding quarter of 1918 the number was 11; in that of 1917, 14; in 1916, 20; and in 1915, 9." While it is to be remembered that a number of different conditions are included under the term "encephalitis," the figures are at least significant. In 17 of the 57 cases I have met with, the patients were living in Edinburgh when the first symptom appeared; while, with four exceptions, the others were residing in a town. Two patients were attacked while on board ship; one, a soldier, was in camp; while one patient was living in a somewhat isolated farmhouse in the country. This experience is of interest, since R. J. Reece,[20] from an analysis of the cases of encephalitis lethargica occurring in England and Wales during the first quarter of 1919, during which period notification was compulsory, finds the proportion of urban cases to cases occurring in rural districts in terms of the population 9·4 to 4·9.

The sexes appear to be about equally liable. Thus, 29 of my patients were males, 28 females; of the latter, 14 were

* Since this paper was read the writer's attention has been drawn to an interesting paper by Leonard Findlay of Glasgow, in which three cases are described in children of from five to ten and a half years of age.—*Glas. Med. Journ.*, Oct. 18.

married. The average age of the males at the time of onset was forty-three, that of the females thirty-five. The youngest patient in the series was seventeen, the oldest seventy-five. Reece's statistics, however, show that a number of cases have been notified in children and even in infants. Although Batten and Still[2] described four cases of "epidemic stupor in children" so long ago as May 1918, there appears to be good reason for believing that encephalitis lethargica is very rare in early childhood. Since 41 of my patients were seen in consulting practice, 10 in civil, and 6 in military hospital practice, it would seem that encephalitis lethargica is at least as common among the middle as among the lower classes. The majority of the patients I have seen had been apparently in good health previously; Bassoe,[1] however, states that nearly all his patients had been in a more or less run-down condition prior to the onset. Instances of more than one case in a family, though very unusual, have been reported by Harris,[9] Farquhar Buzzard, and MacNalty,[14] while Reece[20] has met with a case of a nurse who contracted the illness while attending a patient suffering from the disease. My experience indicates that syphilis, alcohol, and trauma appear to play no part in the causation of encephalitis lethargica.

Seasonal Incidence.

Dr S. P. James,[10] in discussing the epidemiology of encephalitis lethargica with reference to the earlier cases observed in the spring of 1918, states: "Most of the cases reported occurred during the seven weeks between the 16th March and 4th May, and, according to the figures, the disease reached its maximum prevalence somewhat slowly, maintaining its prevalence for a comparatively brief period, and gradually declining." This authority is of opinion that the numbers of cases at that time reported were less an index of the seasonal prevalence of a new disease than they were the index of the rise and decline of activity in discovering and reporting cases of an old one. Since the above remarks were made no evidence, so far as I am aware, has been published which either supports or confutes the question of a seasonal incidence in relation to this disease. My own experience, although I admit the number of cases (57) is perhaps too small to justify definite conclusions, affords, I think,

suggestive evidence in this connexion. I would draw attention to the following points which are illustrated in the accompanying figure. Firstly, in 5 of my cases the symptoms developed

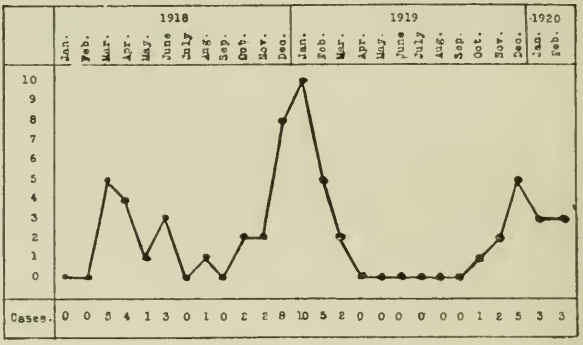
1918
1919
1920
Jan. Feb. Mar. Apr. May. June July Aug. Sep. Oct. Nov. Dec.
Jan. Feb. Mar. Apr. May. June July Aug. Sep. Oct. Nov. Dec.
Jan. Feb.
10 9 8 7 6 5 4 3 2 1 0
Cases. 0 0 5 4 1 3 0 1 0 2 2 8 10 5 2 0 0 0 0 0 0 1 2 5 3 3

CHART I.

Date of onset in 57 cases of Encephalitis Lethargica.

during March 1918. Secondly, I met with but few cases which developed during the summer months of 1918. Thirdly, in no less than 23 cases the illness commenced during December 1918,

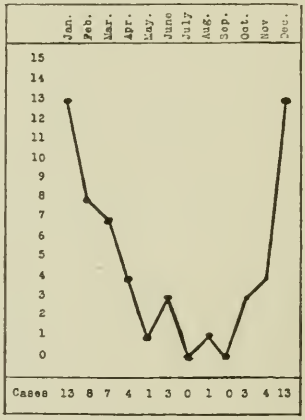

CHART II.

Month of onset in 57 cases of Encephalitis Lethargica.

and January and February 1919. Fourthly, I did not meet with a single case in which the date of onset was between April and September 1919, although, it is true, Dr Byrom Bramwell

observed 3 cases during this period. Fifthly, during the past three months I have observed 11 cases. These figures seem to indicate that there is a tendency for encephalitis lethargica to occur during the colder months of the year.

Botulism, Poliomyelitis, and Influenza.

When the earlier cases of encephalitis lethargica were reported in this country the suggestion was advanced that the condition might be botulism. I am indebted for my knowledge of this condition to Dickson's monograph.

The term botulism is applied to a type of food poisoning which results from the ingestion of sausages, tinned beans, and other articles of diet contaminated with the *Bacillus botulinus*. Outbreaks of this type of food poisoning have been reported from time to time for many years past in various parts of Germany and Austria-Hungary, as also in Denmark, America, and elsewhere. A group of cases was, indeed, described in England in 1860. The symptoms of botulism evidently bear a close resemblance to those of encephalitis lethargica. Thus, in both ophthalmoplegia, general muscular feebleness, defective salivary secretion, constipation, retention of urine, and difficulty in swallowing are common features. On the other hand, botulism is preceded by gastro-intestinal symptoms, there is no febrile disturbance, the cases occur in groups, and their origin can be traced to a food product, while the *Bacillus botulinus* of van Ermengem is, it is affirmed, readily detected in the stools.

Acute poliomyelitis is another disorder which presents points of similarity to encephalitis lethargica, and it has been suggested that the latter disease may be due to a modification of the virus which is responsible for the former.

The two affections resemble each other in that both are dependent upon an infective process, and in both the causative agent attacks the central nervous system; while, further, the sporadic manner in which cases of both disorders crop up throughout the country is very similar. There are, however, strong arguments which are opposed to the view that the resemblance is more than superficial. Thus, I have met with no cases of encephalitis lethargica which presented a localised flaccid palsy such as one meets with in poliomyelitis. Again,

when some years ago poliomyelitis was comparatively frequent throughout the country cases of encephalitis lethargica were not observed. Further, according to Reece,[20] poliomyelitis showed no increase throughout England and Wales in the first three months of 1919, though encephalitis lethargica was prevalent. Again, the age incidence is different, poliomyelitis being essentially a disease of children and young adults, while encephalitis lethargica is much more frequent in adult age. Lastly, poliomyelitis occurs especially in the late summer and autumn, while the evidence I have adduced suggests that encephalitis lethargica is met with during the colder months of the year. I might mention other points of difference, but those I have noted are, I think, sufficient to show that the two affections are in many respects dissimilar.

Influenza has of late been rife throughout the country, and the question arises whether the disease under consideration may be due to the virus of influenza, and if this is not the case whether there is any relationship between the two conditions.

It is noteworthy in this connexion that a number of cases of encephalitis were recorded by Leichtenstern[11] and other German writers at the time of, and subsequent to, the great influenza epidemic of 1889-90, and that about the same time a peculiar disease termed "Nona,"[1] which was characterised by pronounced drowsiness, was very prevalent in Austria and Northern Italy. Nauwerck,[17] in 1893, discovered the Pfeiffer bacillus in the brain of a fatal case of encephalitis, and Cantani, three years later, succeeded in producing an encephalitis experimentally in rabbits by injecting a dead culture of the influenza organism. These facts are very suggestive, and Oppenheim and Cassirer,[19] in their monograph upon encephalitis published in 1907, describe an influenzal type of encephalitis which, to judge from their description, is so very similar as to be almost indistinguishable from encephalitis lethargica. That an encephalitis may occur in the course of influenza, just as it does very exceptionally in the course of a great variety of infective disorders, is highly probable, but the available facts do not appear to me to justify the conclusion that epidemic encephalitis, which is almost certainly due to a specific infection, is dependent upon the same virus as influenza. The following observations are of interest in this relation. Firstly, in no single instance among the cases

of encephalitis I have met with, in which the patient was living in a private house, were there cases of influenza in the family. Secondly, I have observed no case of encephalitis in which there was evidence of infection from person to person. Thirdly, with a few (? two or three) possible exceptions, in no instance was the illness ushered in by catarrhal symptoms, prostrating frontal headache, or severe pain in the back and limbs such as are recognised to be common clinical features in many influenza epidemics. Fourthly, with very few exceptions, a history of a recent attack of influenza was not forthcoming. Fifthly, during the past three months, while there has been comparatively little influenza in Edinburgh or its neighbourhood, cases of encephalitis have not been infrequent. Finally, the circumstance that two infective disorders are epidemic at the same time is no proof that they are dependent upon the same infection. It may well be that common predisposing factors exist which, by lowering the general resistance, determine their simultaneous incidence.

Prognosis.

The mortality in encephalitis lethargica varies considerably, to judge by the recorded experience of different observers.

Thus, 6 cases of 11 reported by Economo, 7 of Netter's 15 cases, 2 of Wilson's 13 cases, and none of Hall's[8] 16 cases died, while 9 of the 57 cases I have observed terminated fatally. The mortality among 126 cases collected by the Local Government Board in 1918 was 20 per cent.; while of the 61 cases observed in the Winnipeg epidemic more than a third died. According to Netter, death may be due to an extension of the encephalitis to the medulla, to pneumonia secondary to paralysis of the vagus or glosso-pharyngeal, or to general wasting complicated by bedsores. The ages at death of the nine patients included in my series were as follows: 17, 18, 24, 27, 32, 42, 45, 47, and 60. Five of my patients died between the eighteenth and twenty-second day after the onset of symptoms, one patient dying on the seventh day, another during the fourth week. In this connexion it is of interest to note that the average duration of the illness in the 25 fatal cases collected by the Local Government Board was 21 days, the shortest being 6, the longest 49 days.

My experience does not justify me in formulating any very definite conclusions in relation to prognosis. The circumstance that the three patients in whom the onset was apoplectiform made a good recovery, as did all the patients (4) in whom pronounced meningitic symptoms were a prominent feature in the early stages, is of interest, but may be explained by coincidence. In three of my nine fatal cases, all of which presented a mesencephalic localisation, the general symptoms were pronounced and the focal manifestations comparatively insignificant. If the patient survives the first three weeks of his illness the probabilities are all in favour of recovery. A high temperature, pronounced and deepening stupor, with accompanying dysphagia and loss of sphincter control, are symptoms of serious moment, though not necessarily indicative of a fatal termination.

Improvement is almost always slow in those cases which eventually recover. The patient may remain for weeks or even months in a state of semi-stupor. On the other hand, abortive cases are met with, and are very possibly much more frequent than my experience suggests, in which recovery is practically complete after two or three weeks. Sometimes the general phenomena pass off in a few weeks, leaving merely focal symptoms, which may be very persistent. Complete, or practically complete, recovery was the rule in the majority of the cases I have met with. In several, however, such symptoms as general weakness, slow mental action and defective concentration, want of initiative, giddiness, defective vision, sluggish pupils, and ocular pareses with diplopia still persist and will probably prove to be permanent. Hall[8] states that recovery was complete and absolute in seven of his cases; practically complete in six cases, some slight trace of illness being left behind; while three cases, after six months, were still far from recovery. I am inclined to think from my experience that the longer the state of somnolence or stupor persists the more likely are the focal nerve symptoms to be permanent. Buzzard and Greenfield[8a] point out that some time after the patient has recovered from the original illness a relapse characterised by involuntary movements may occur. I have observed two instances of the kind.

Treatment.

No therapeutic means have so far been proved to have an undoubtedly beneficial effect upon the course of the disease. A specific remedy has yet to be discovered.

Obstinate constipation is the rule in the early stages, and the use of calomel and other purgatives has been advocated for its relief. I am inclined to think that I have seen improvement in the general lethargic state as a sequel to a loose movement of the bowels. Hexamin in doses of 10 gr. four-hourly was administered in most of the cases I have seen during the first days of the illness, but whether any definite beneficial result was thereby effected I am not prepared to say. Three cases which were under my care in hospital for a period of several weeks afforded opportunity for observing the effects of remedies. Since in sleeping sickness and syphilis of the cerebral vessels a state of somnolence or stupor is observed, and since both these affections are characterised pathologically by a perivascular infiltration, the possibility that iodides or arsenic might prove beneficial suggested itself. Anticipations were, however, not fulfilled, for these drugs, given in full doses, produced no definite improvement. Netter[18a] states that he has seen disastrous results follow the use of neosalvarsan, while he has observed no beneficial effect produced by antimony. Strychnine administered hypodermically in increasing doses up to a twelfth of a grain appeared to me to be of undoubted benefit in more than one case in which the state of somnolence was unduly prolonged. In one case I was rather inclined to think that quinine was of some service. Netter[18a] is of opinion that he has seen benefit follow the production of a local abscess by the injection of 1 or 2 cm. of turpentine into the thigh.

Note on Post-mortem Findings.

The material forming the basis of the pathological inquiry consisted of five fatal cases at the Edinburgh City Hospital and Royal Infirmary.

Morbid Anatomy.—As M'Intosh observes,* as a rule the autopsies in encephalitis cases are negative; in other words, no

* Reports to the Local Government Board, New Series, No. 121.

macroscopic changes sufficient to account for death are present. In one of the cases which died in the City Hospital in March 1919 there was a well-marked purulent bronchitis and broncho-pneumonia, but as similar appearances were found in cases dying of "influenza" about that time no great stress could be laid upon the observation. In another case, which was under the charge of Dr Chalmers Watson, a surface hæmorrhage was observed in the cerebellum measuring ½ inch across, with extravasation of blood under the pia arachnoid at the base of the brain. (Fig. 1.) A similar case is recorded by M'Intosh, so that in cases of so-called meningeal hæmorrhage the possibility must be borne in mind that one is dealing with encephalitis lethargica. In all the five cases the surface vessels of the brain were injected, and on section the grey matter of the brain, cerebellum, and cord were unusually dark. There was some excess of cerebro-spinal fluid at the base of the brain. This fluid was clear and there was no exudate or opacity about the meninges. With the exception of the large hæmorrhage and some smaller ones in the neighbourhood in the case already mentioned, no extravasations were found in the brain substance, although a dilated vessel often gave the appearance of such. In one of the cases, a cyst, the size of a walnut, was present at the tip of the left temporo-sphenoidal lobe.

Microscopic Appearances.—In each case the chief changes were met with in the pons and neighbouring portions of the mid-brain. In one instance the changes extended into the cervical cord, but the cerebellum (with the exception of the case already mentioned) and the cerebral cortex were relatively free. In relation to the distribution of the disease in the central nervous system the question arises as to what is to be regarded as the most characteristic lesion. In my experience little reliance can be placed upon the chromatolytic changes in this respect. The ravages of post-mortem change and the frequent coincident toxic effects on the ganglion cells render chromatolysis as a criterion for the extent of the disease most unreliable. Œdema, again, although a striking change in certain situations, is often ill-defined and spreads beyond the area of brain associated with clinical symptoms. A much more sure guide to the actual degree of irritation is the perivascular infiltration. This change, although not an indication of such

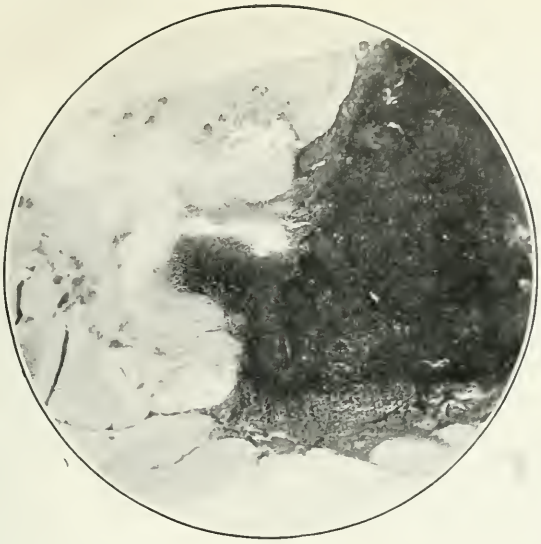

FIG. 1.

Large hæmorrhage in the substance of the cerebellum near the surface. Numerous minute hæmorrhages.

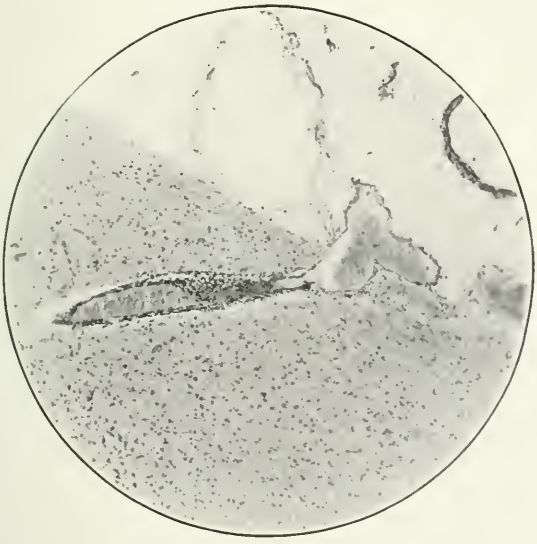

FIG. 2.

Section of mesencephalon close to surface, showing how in encephalitis a meningeal vessel acquires the sheath of inflammatory cells only after penetrating the brain substance.

[*Face page* 96.

profound and permanent alteration as the proliferation of the neuroglia or hæmorrhage, is probably the best guide to the extent of the affected nervous tissue.

Changes in the Nerve Cells.—As already stated, the disturbances in the Nissl spindles and nuclei of the nerve cells are, in view of concomitant post-mortem and toxic changes, neither striking nor uniform. They certainly occur, as is evidenced by the loss of staining of the Nissl bodies and pale staining of the nucleus (although the nucleolus, as a rule, stains well), but the more advanced changes of disappearance or extrusion of the nucleus seldom occur. Moreover, these changes may not be met with in very striking degree in the cells of nuclei of nerves which are clinically affected. These degenerative changes in nerve cells are widely distributed. They occur not only in the mid-brain nuclei but in the grey matter of the cord and cerebellum. Marinesco, describing two cases of the disease,* lays special stress upon changes in the Purkinje cells of the cerebellum. He speaks of them being profound. Da Fano and Ingleby† also refer to nerve cell changes of a chromatolytic nature as being severe and widespread. In my series of cases no such striking changes were seen. I agree with M'Intosh (*loc. cit.*) when he states that "in no instance was there that complete absence or destruction of the ganglion cells which occurs in the spinal cord in poliomyelitis."

Perivascular Infiltration.—Certainly the most arresting microscopic change is the presence in large numbers of round cells in the perivascular lymph sheath of the vessels which have entered the brain substance. In my experience the vessels of the meninges are not affected in this way. Indeed, it is quite striking to observe the sudden appearance of the casing of cells as the vessel passes from the pia arachnoid into the cerebral tissue. (Fig. 2.) Outside, even in sulci and depressions, there is little evidence of cellular infiltration of the meninges. This is apparently in contrast to the observations of Loewe, Hirschfeld and Strauss‡ in encephalitis experimentally produced in monkeys and rabbits. In one of my cases the perivascular

* Reports to the Local Government Board, New Series, No. 121.

† *Proceedings of the Royal Society of Medicine*, 1919, vol. xii., Section of Pathology, p. 42.

‡ *Journal of Infectious Diseases*, vol. xxv., No. 5, p. 378.

infiltration was clearly seen in sections of the lower cervical region of the cord.

As regards the nature of the cells taking part in this infiltration, a majority appear to me to be lymphocytes or cells indistinguishable from such. M'Intosh differentiates a certain number of polyblasts of Maximow and plasma cells. Marinesco describes fibroblasts, and in certain situations cosinophils. I have seen polymorpho-nuclear leucocytes in considerable numbers in one case.

Œdema.—This is a term which, when applied to the central nervous system, is a little apt to be loosely used. Dilatation of the perivascular lymph space may be artificially produced by imperfect fixation. This change is, however, too constantly present and striking in encephalitis to be of the nature of an artefact. In addition to this, often widespread, manifestation of œdema there is an interstitial dropsy of a more significant type. In my series of cases it has been a striking feature of parts related to the third nucleus and its fibres as they leave the pons. (Fig. 4.) The initial change is a bubble-like clear space which appears in the substance of the pons separating the nerve elements from one another and extending often in a longitudinal fashion for some distance. This spread is particularly well seen along the course of the third nerve before it leaves the pons, resulting in a splitting and separation of the fibres from one another. The same change is also well seen in the substantia nigra. (Fig. 3.)

Hæmorrhage.—The frequency of hæmorrhage is perhaps exaggerated. This is probably more characteristic of poliomyelitis than of encephalitis. It shows itself first, as a rule, in the perivascular lymph space. This space, instead of being empty or containing round cells, is filled with red blood corpuscles. Less frequently these hæmorrhages occur into the cerebral substance, and occasionally, as already mentioned, they occur on the surface of the brain. In my series of cases, except in one instance, hæmorrhage was not a conspicuous feature. In this case there were numerous hæmorrhages, one of them large, into the substance of the cerebellum close to the surface. The blood extended along the subarachnoid space for some distance and blood was present in the cerebro-spinal fluid. Hæmorrhages of this type no doubt account for the occasional

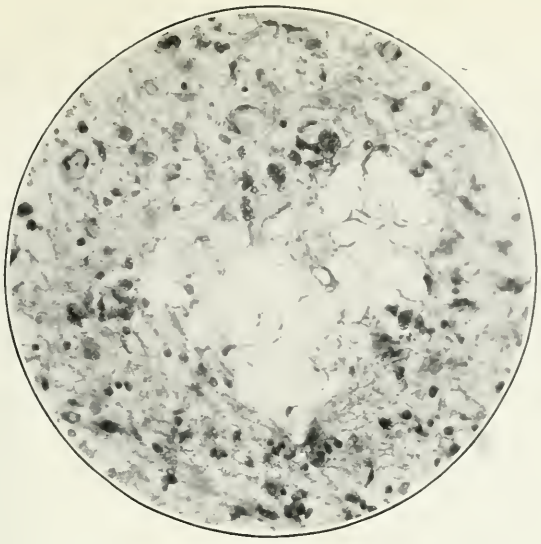

FIG. 3.

Section of mesencephalon showing interstitial œdema of substantia nigra. There is also scattering of the normal pigment.

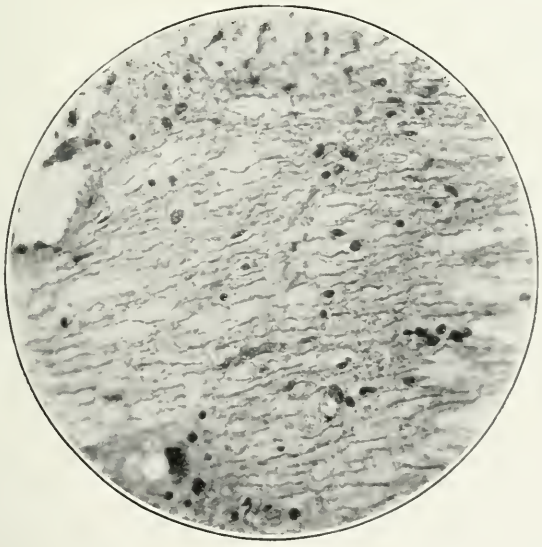

FIG. 4.

Œdema of the fibres of the third nerve before its exit from the mesencephalon.

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occurrence of a blood-stained fluid obtained by lumbar puncture.

Pigmentation.—This appears to have been a striking feature of the cases studied by Da Fano and Ingleby. These observers found the pigment in nerve cells both near and at a distance from points of cell infiltration. In my series of cases I found little evidence of such pigmentation. It was present in the cells of the fourth nucleus in one instance, but I saw no evidence at all of the other "granules" described by Da Fano and Ingleby. Many of my sections were stained by Leishman's method, but I failed to observe the bluish-white corpuscles, oval or rounded in form, seen by the same observers. Apparently Da Fano and Ingleby (*loc. cit.*) relate the pigment granules and corpuscles to one another, suggesting that they may be of the nature of a causal germ.

An interesting alteration in the distribution of the pigment of the substantia nigra was a striking feature of all my cases. The pigment, instead of being confined to the nerve cells themselves, was scattered in rounded masses in the surrounding tissues, both free and inside phagocytic cells. (Fig. 3.) There was at the same time a proliferation of the neuroglia cells in the neighbourhood, the pigment being largely contained in the proliferated neuroglia cells. Not infrequently these cells, as Marinesco points out, contain several nuclei.

Summing up the histological changes I would give chief place to: (1) hæmorrhage (a rare occurrence in my series of cases); (2) œdema of the nerve tissue; (3) proliferation of neuroglia; and (4) infiltration of nerve tissue and perivascular lymph sheath with cells, usually lymphocyte-like in type. In the cases which I have examined these changes are seen most strikingly in the ventral portion of the pons, especially in the region of the substantia nigra, implicating the fibres of the third nerve as they pass out, and thus accounting for one of the most common symptoms of the disease.

In no case were any organisms, or bodies suggesting organisms, seen.

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Dr James Miller gave a lantern demonstration illustrating the pathology of the disease. There was congestion of superficial vessels and darkening of the grey matter. The part of the brain affected was very limited. The condition was an encephalitis, not a meningitis. None of the organisms isolated were constant. The condition could not be diagnosed from the pathological findings. He considered that it was due to a microbe which inhabited the nasopharynx.

Discussion.

Dr Fleming expressed his great appreciation of the papers read by Dr Edwin Bramwell and Dr James Miller. He said he had not come across many cases of encephalitis lethargica, but he wished to refer to one particular case admitted to his ward in December 1918. The case was under observation until the end of April 1919 and presented some interesting features.

Patient aged nineteen with marked lethargic symptoms, and had been ill for one week before admission. Temperature was never normal and kept about 102·5 for three or four weeks, sometimes going up to 103 at night. Patient was very

constipated and bowels acted very irregularly and inefficiently. There was no paralysis at all; but during the illness patient had a purulent discharge from the nose. There was great difficulty in breathing, and an examination of the throat was made very difficult owing to the jaws being tightly clenched. There was, however, no difficulty in swallowing. Another feature of the case was that the patient suffered very great pain in both legs. There was no rash. Cyanosis was also present to a marked degree. The nurses had great difficulty in making the patient do what was wanted; sometimes she did not seem to understand what was being said to her and a question had to be repeated several times; even then she only answered "Yes" or "No."

The chief points in treatment were: Hexamin was given; but this did not do very much good. The first thing to do any good was lumbar puncture and this was done several times. Fluid was clear and there was nothing abnormal. Patient derived great benefit from this and began to improve.

At first the patient was very weak and he had little hope of her recovery, but she made very rapid progress and is now practically completely recovered.

Regarding "Diagnosis" Dr Fleming referred to statements made by Dr Cruickshank. Dr Fleming thought that diagnosis, where there was no lethargy, was impossible, and he thought that the disease was distinct from poliomyelitis. Very often, too, he thought it was difficult to know whether a case was really encephalitis lethargica or paralysis agitans. Referring to post-mortem examinations, Dr Fleming was decidedly of the opinion that such examinations must be done immediately after death to be of any use in the diagnosis of a case. If post-mortem examination is not done until some time after death, nothing can be concluded from the condition of the brain cells, etc.

Dr Chalmers Watson was interested in the reference made by Dr Bramwell to the frequent existence of constipation and other evidence of intestinal disorder, and to the relief of symptoms afforded by the use of aperients. This raised the question of the possible rôle which an auto-infection played in the development of the disease. The speaker had had experience of three fatal cases. Post-mortem examination had revealed no

characteristic and uniform picture. Clinically there had been evidences of profound derangement of the bowel. With our present knowledge it was impossible to say whether this derangement was a cause or a result, or merely a concomitant condition. The point was one which merited very careful investigation along lines that had so far not been adequately investigated.

Dr Dewar referred to the question raised in Dr Bramwell's paper of encephalitis lethargica possibly arising from influenza. Dr Bramwell had stated that he had not come across one case of encephalitis lethargica in a house where there had been influenza; Dr Dewar said that in February 1919 he had a case of encephalitis lethargica in a lady about twenty-five or twenty-six years of age, in a house where the mother and three sisters were in bed with very pronounced attacks of influenza. He thought at first that his patient might have influenza too, but in a few days she developed symptoms such as those described as characteristic of encephalitis lethargica. As there was no one in the house able to look after her he had to have her removed to ward 3 in the Royal Infirmary, where, however, she died in less than twenty-four hours after admission.

Dr Comrie said he had had several cases of encephalitis lethargica brought under his notice while in France. These cases, he noticed, were nearly all in war-worn men and very largely among the German prisoners. Most of the men he would have called "neurasthenic," and he thought there was a functional element in all the cases. He believed that had the men not been so war-worn and tired the disease would have been much less pronounced and severe. He had found that there was generally some paralysis, particularly in the third nerve. He had had three cases which, after the lethargy had passed off, resembled closely poliomyelitis. He referred to Sir John Rose Bradford's account of cases of encephalitis lethargica, and to work he and others had done on filter-passing organisms.

Dr Fowler said there were two points to which he would like to draw the attention of the meeting. (1) The disease was rarely met with in children. There had not been one case in

the children's hospital. (2) Were not acute cases of the disease liable to be overlooked? During the last two years since the disease was recognised some acute cases had been seen, all of short duration, with very marked cerebral symptoms and all terminating in coma. Some had no post-mortem examination, some had, but no definite changes were found. One case in particular had impressed him greatly—illness of four days' duration; earlier symptoms of most extreme pains in the legs which lasted about two and a half days, and then the patient became paralysed and died shortly after. He wondered if other members had had similar cases, and if Dr Bramwell did not think that cases of the disease had really occurred frequently—much more so than is believed—and had been wrongly diagnosed.

Dr Claude Ker said that he had had several cases of encephalitis lethargica brought to his wards diagnosed as "meningitis." Symptoms indicative of encephalitis lethargica were, he thought, much more pronounced on admission than any which might suggest meningitis. In every case lumbar puncture was done at once, and the patients derived great benefit from it. One interesting symptom was very marked sweating limited to one side of the face.

He referred to Dr Chalmers Watson's remarks. The question of constipation as an important factor in the causation of the disease, was an interesting one. But if a patient was lethargic, and had been in this sleepy condition for some time, would he not have got into a very constipated condition before he reached the physician's hands at all? Thus, is constipation a cause of the disease?—and would it really interfere with the therapeutics of the case? Most cases developing a state of coma were, he thought, decided cases of encephalitis lethargica, but that could not be definitely determined until after post-mortem examination, though very often he had found that there was absolutely nothing to be seen at the post-mortem examination.

Dr Bramwell said that lumbar puncture had not been followed by benefit in his cases. He held that the symptoms had a close relationship to the localisation of the lesion. Tremor

and gait affection were related to lesions of the red nucleus; nystagmus to the cerebellar peduncles, ataxia to the posterior longitudinal bundle, and lethargy to œdema cutting off afferent impulses.

Meeting V.—March 3, 1920

Emeritus-Professor F. M. CAIRD, *President, in the Chair*

I. Election of Members.

Francis James Browne, M.D., F.R.C.S.E., 7 St Catherine's Place; Katherine S. Clark, M.D.Ed., D.P.H., 16 Drummond Place; John Michael Dewar, M.D.Ed., 5 Chalmers Street; Herbert Calder Elder, M.B., Ch.B.Ed., Health Department, City Chambers; Marian Erskine, L.R.C.P., L.R.C.S.Ed., 12 Howard Place; Gertrude Hertzfeld, M.B., Ch.B.Ed., 8 Randolph Crescent; Thomas Malcolm Murray-Lyon, M.D.Ed., 46 Palmerston Place; R. H. Herdman Newton, B.A. Cantab., M.B., Ch.B.Ed., 4 Rosebery Crescent; Charles Wm. Somerville, M.B., Ch.B.Ed., D.P.H., Viewpark, Bonnyrigg; Isabella B. Venters, M.B., C.M.Ed., L.L.A. St And., L.R.C.P. & S.Ed. L.R.F.P.S. Glasg., 2 Greenhill Gardens; H. Ballingall Watson, M.A., M.D.Ed., 1 Clifton Terrace; Ernest Watt, M.D.Glasg., D.Sc. (Pub. Health), Local Government Board for Scotland, 125 George Street.

II. Original Communications.

1. ADENO-SARCOMATOUS TUMOURS OF THE KIDNEY: A CLINICO-PATHOLOGICAL STUDY*

By JOHN FRASER, M.D., F.R.C.S.

During the first five or six years of life, tumours of the kidney are uncommon, but if a renal tumour makes its appearance during this period, it is most likely to be of the type which has been called the "mixed tumour" or the "adeno-sarcoma."

Since November 1917, over a period that is to say of

* The pathological work of this investigation has been carried out at the Laboratory of the Royal College of Physicians.

FIG. 1.

A child, 18 months old, suffering from a large adeno-sarcomatous tumour of the left kidney.

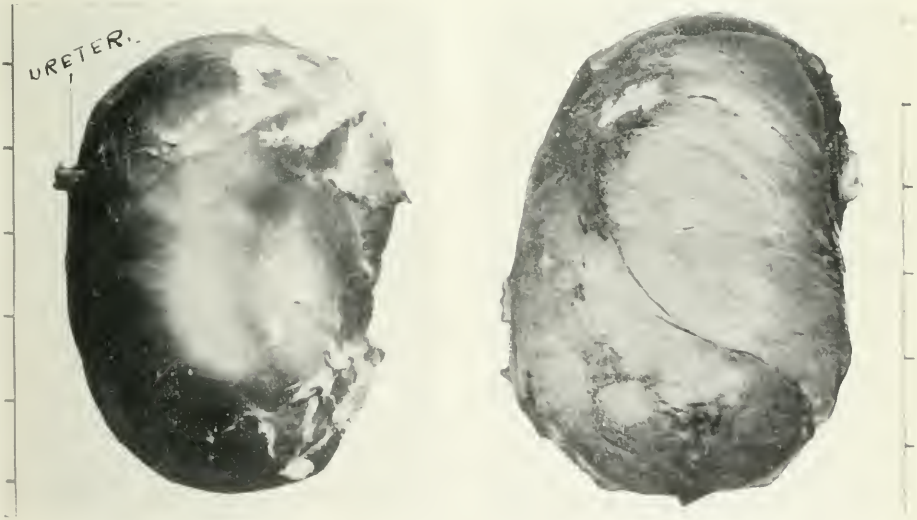

FIG. 2.

FIG. 3.

Figs. 2 and 3.—The appearance of the tumour. Fig. 3 represents the tumour on section. Note in Fig. 2 the attachment of the ureter, and the absence of the pelvis of the kidney.

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practically two and a half years, I have seen at the Children's Hospital seven examples of kidney tumours, and all of them have been of the type of the so-called "mixed tumour." It must therefore be looked upon as a rare condition, as, during this period, some 15,000 new cases have passed under review.

Age Incidence.—The youngest child of the series showed evidence of the tumour formation in its right kidney when it was one month old. It was five months old when it received treatment. The oldest child of the series was six and a quarter years old. Of the intervening cases, two were between one and two years of age, one was two and a half years, and two were

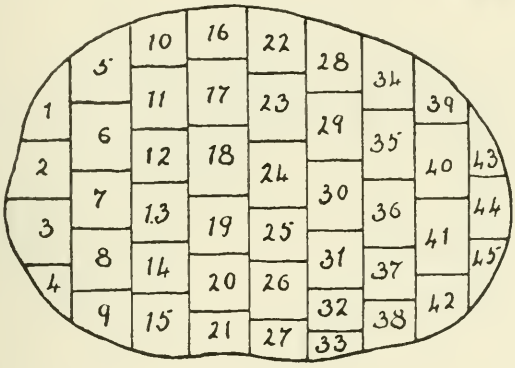

FIG. 4.

This illustrates the method of investigation of the tumour—the numbered "block" model of the tumour.

between three and four years. It is interesting to notice that though the Hospital admits patients up to the age of twelve years, no instance of tumour formation occurred at a later age than six and a half years.

In order to lead this point to a fuller conclusion, I have gone over the Hospital records for the past twenty years, bringing under review some 85,000 children, and in no instance have I found record of a tumour formation of this description at a later date than seven years. The tumours, therefore, have made their appearance at some period during the first seven years of life.

This peculiarity of the age incidence is borne out by the published statistics of writers who have had a vastly greater

experience than I can claim. Albarran and Imbert[1] have recorded an analysis of 165 cases. Of this number, 152 occurred during the first seven years. Stiffen's[2] statistics included 213 cases. 203 of these occurred during the first seven years of life.

It is not intended to infer that cases do not occur during later childhood, adolescence, or even later adult life. Various observers have recorded cases at eighteen years (Horsholt[3]), thirty-four years (Muus[4] and Marchand[5]), thirty-five years (Kocher and Langham[6]), forty-three years (Jenckel[7]), and fifty-seven years (Busse[8]). But while accepting these as true examples of embryonic renal tumours, it is none the less certain that by far the greatest proportion occur during the first seven years.

Question of Sex and Side affected.—There is no distinctive feature as regards sex, male and female occur in very equable proportions. Nor is there any special importance as regards the side affected.

The bilateral cases are interesting. A single example is included in the present series. The question arises as to whether both kidneys are attacked independently, or whether the disease has been primarily in one kidney and the second has been involved by metastasis. I confess I am unable to state which of these possibilities is the correct one.

The Clinical History.—The clinical histories recorded in the cases which came under observation may be summarised somewhat as follows :—

While the child is well nourished, active, and apparently healthy, a gradual increase in size of the abdomen is noticed. Coincident with this observation, it is generally recognised that the child is beginning to suffer from an increasing tendency to constipation. The abdominal swelling increases slowly but steadily, and cathartic medicines are resorted to in order to overcome the constipation. Then, and most frequently by chance, a local tumour formation is discovered in the region of the kidney. When the discovery is made, medical advice is usually sought, but in many cases the child's general well-being is so deceptive as to lead the parents to believe that nothing very serious is at fault, and further delay is encouraged. With comparative suddenness the clinical features alter. The

abdominal swelling rapidly increases in size, the surface veins of the abdomen become prominent, the constipation is more persistent, there may be recurrent attacks of vomiting, and, what is the most distinctive of the late features, the child rapidly begins to lose flesh and weight. If medical advice has not been sought earlier, it is almost certainly obtained at this stage.

I would especially draw attention to the fact that no urinary symptoms (excluding the tumour formation) have been apparent. There has been no alteration in the act of micturition, and nothing abnormal has been noticed in regard to the urine. To this statement I would add a single qualification. In one of

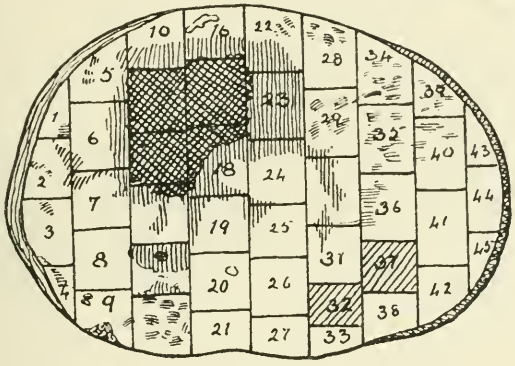

FIG. 5.

A reconstructive view of one of the planes of the tumour.

the cases there was a history that about one year before any serious symptoms appeared, a temporary hæmaturia made its appearance. This observation was made by a medical man, and I see no reason to question its accuracy. It was a very temporary feature, lasting for about five days. It entirely disappeared, and there was no reappearance of this feature in the subsequent history of the case. I believe that importance should be attached to this feature, and I shall reconsider its significance later.

If the tumour formation remains unrecognised or untreated, the subsequent history is that of a rapidly fatal disease. The abdominal swelling continues to increase, fluid appears in the abdomen, and secondary tumour formation can be recognised.

The lower limbs become œdematous as the result of venous pressure, the general body wasting becomes more marked, and it is all the more striking when contrasted with the abdominal tumidity. Death ensues as the result of cachexia, of some intercurrent disease such as broncho-pneumonia, or of a metastatic growth in a vital region.

An Analysis of the Clinical Features.—There are certain points in the clinical history of these cases which demand a closer attention.

A. The General Outlines of the History.—The child does not show signs of general disturbance from the commencement of the disease. In the early stages of the tumour formation, and up to a point when the growth may have attained a considerable size, the child remains in excellent health and condition, if one excludes the occurrence of constipation. After a certain stage is so reached the picture entirely alters, and the child very rapidly goes down hill.

This sequence of events is characteristic and striking. It is entirely in keeping with what one learns from a study of the pathology of the disease. I draw attention to it now from the clinical standpoint, and I shall attempt to explain it when I deal with the pathological changes.

B. The Absence of Urinary Symptoms and Signs, more especially the Absence of Hæmaturia.—I have already alluded to the possibility of early temporary hæmaturia, and I shall elaborate this point later ; but omitting this point, it is surely a most remarkable feature that in a tumour of the kidney—it may be of great size—there is an entire absence of any abnormality in the urine. I am aware that the majority of text-books state that hæmaturia is a characteristic feature of the disease, but I can only say that in the cases which came under my observation a most careful examination of the urine was made, and in no case was any abnormal constituent found to be present. When I discuss this point in the light of the pathological evidence, I believe that I shall be able to show that one would be extremely surprised to find any change present in the urine as it is passed "per meatam."

C. Subsidiary Features.—There are other features in the clinical history which are interesting, but none of these possess the significance of the two which I have mentioned.

One is impressed by the comparatively "silent" nature of the tumour formation. Even in a well-established case when the size of the growth is so great as to occupy a considerable portion of the space in the abdominal cavity, the symptoms are remarkably few. Pain, for example, is very rarely complained of, and when it appears it is generally found to be due to colic. The constipation is perhaps the most insistent feature, and its occurrence is not difficult to explain. It results from a displacement of the colon, and from a stripping of the large bowel from its attachments to the posterior abdominal wall.

I shall have occasion to refer again to the various clinical features when I have dealt with the pathology of the tumour.

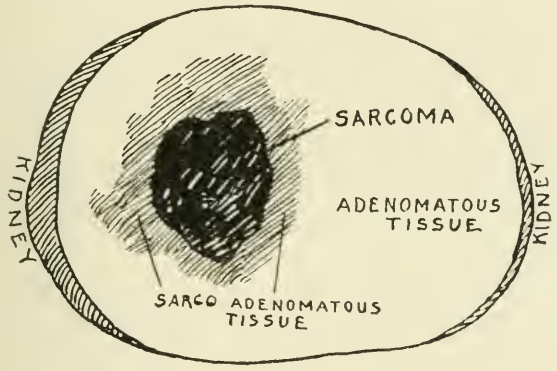

FIG. 6.

An illustration to show the distribution of the various tissues of which the tumour is composed.

In the light of the pathological evidence many of the apparent obscurities are cleared up.

Some Pathological Considerations.—*The Relations and Naked Eye Appearances of the Tumour.*—When the abdomen is opened in one of these cases, the tumour appears as a rounded, bluish mass, filling up one side of the abdominal cavity. Usually the surface of the tumour is smooth, but in the advanced stages, knob-like irregularities appear on the surface. These are of extreme importance from the point of view of prognosis, as I shall show later.

The consistence of the growth is either firm or soft, firm if

the tumour is a solid one, and soft if degenerative changes have taken place within it.

Resulting Displacements.—The overlying tissues are displaced in a definite relationship, the colon where it passes over the tumour is displaced forwards and medially, the small intestine is carried towards the opposite side from the tumour. The duodeno-jejunal junction may be considerably altered in position if the tumour reaches any great size. In one instance I found that the junction, together with the third portion of the duodenum, was completely loosened from its posterior attachment, with the result that the ligament of Treitz acted as a suspender, and so gave rise to a marked degree of kinking at this portion of the bowel. In this case, sickness had been a noticeable feature in the clinical history, and I have no doubt that it owed its origin to this displacement.

When the tumour originates on the right side, the second portion of the duodenum shows a considerable displacement towards the middle line. The blood supply of the bowel is sometimes interfered with, the veins to a greater extent than the arteries. The inferior mesenteric vein may be displaced to such an extent that there is considerable interference with the return of blood along this channel.

Appearance on Section.—On section the tumour is greyish, white, or yellow in colour, and if hæmorrhage has taken place within the tumour, a darker colour may be apparent.

In some instances cyst formation occurs, and these cysts are the result of previous hæmorrhage, or of degenerative changes.

Changes in the Upper End of the Ureter.—In the specimens which I have had an opportunity of examining, there has been this remarkable feature that no pelvis of the kidney can be made out. The quill-like ureter is attached to varying points along the mesial edge, but there is no expanded portion apparent at its upper extremity. The tissues of the ureter wall appear to be continuous with the capsule of the tumour. When the lumen of the ureter is opened and the lumen traced upwards, its upper extremity is found to be closed by the expanding mass of the tumour, and there are no traces of calyces. It is therefore only reasonable to assume that the tumour formation has no secretory functions, and that after the tumour becomes well established, no fluid passes downwards along the ureter.

Abnormality of the Blood Supply.—The striking feature of the blood supply is the meagreness of the arterial distribution. I, of course, have only been able to judge of this from injected specimens of the tumour; I have not had an opportunity of observing the blood supply in early specimens when the tumour formation has been localised; but allowing for this consideration, there is none the less a distinct abnormality of the arterial supply, and this has been a constant feature in all the specimens which I have examined.

The main renal artery is relatively a small tenous vessel. From it there is a distribution of blood to the poles of the

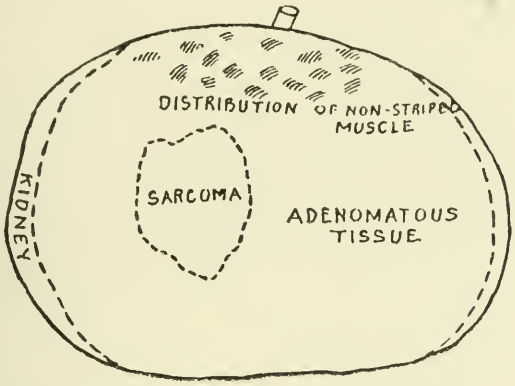

FIG. 7.
A reconstruction of the tumour to show the distribution of the non-striped muscle.

tumour, while the centre of the growth is very imperfectly supplied.

I, of course, recognise that as a result of the alteration of the whole kidney contour, it is impossible to form any exact estimate as to the extent of this abnormality, yet I believe that there is a distinct error in the distribution of the arterial supply.

The renal vein is of moderate size, and its radicles are grouped in a fan-shaped arrangement throughout the tumour.

The Modern Views regarding the Origin of the Tumour.—I do not intend to give in detail the various theories which have been brought forward from time to time in explanation of the tumour growth, but I shall summarise the modern views into three groups:—

A. It has been taught that the tumours owe their origin to inclusions of Wolffian tissue which have become displaced, and which persist among the cells of the developing kidney or metanephros.

B. There are those who believe that aberrant cells of the myotome and sclerotome are responsible for the tumour growth, and they claim that the apparent "mixed" character of the tumour is to be explained by the varying constituents which enter into the ultimate formation.

C. The third school believe that these tumours are not due to inclusions from extrarenal sources, but that they are derived from the embryonic tissue of the true kidney, the embryonic tissue persisting and becoming metamorphosed into cellular structures of varying types.

These three views are widely different in their teachings, and it was partly with a view to satisfying myself of their relative values that I undertook a detailed investigation of the pathology.

I shall therefore describe (1) the method which was followed in studying the pathological changes; (2) the results of the pathological investigations; (3) the deductions which one drew from the pathological findings in regard to the origin and development of the tumour.

(1) *The Method of Examination.*—It is obvious that in order to obtain a collective idea of the tumour structure, it was impossible to rely upon the examination of a few sections taken at random from the bulk of the tumour. The "block" method of examination was therefore employed. A median coronal section of the entire kidney was made in two parallel planes. A model of this was accurately made from thick paper and the tissue was subdivided into a number of blocks, as far as possible equal in size. These were numbered and their position noted upon the accompanying model. Each block was then sectioned and examined microscopically and the appearance recorded upon the key. In this way, a microscopical picture representative of a mesial section of the entire kidney was obtained.

With this knowledge it has been possible to visualise the exact distribution of the tumour, and further, it has been possible to demonstrate any progressive changes which may be occurring.

(2) *The Results of the Pathological Investigations.*—It was apparent that at least six different tissues entered into the formation of the tumour: (*a*) True renal tissue. (*b*) An acinar or adenomatous tissue. (*c*) Sarcomatous tissue. (*d*) Non-striped muscular tissue. (*e*) Connective tissue. (*f*) Vascular tissues.

I shall briefly summarise the important points in regard to each of these :—

(*a*) *The Renal Tissue.*—True kidney tissue is distributed as a thin cap-like area upon both poles of the tumour. With the

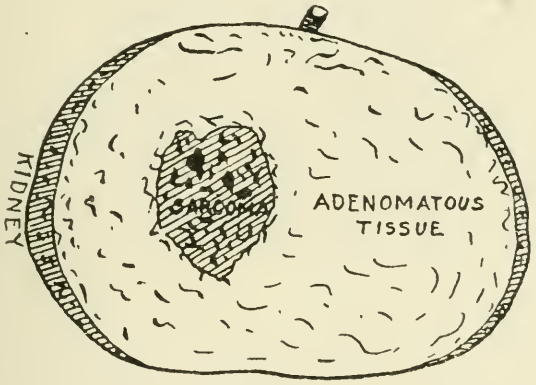

FIG. 8.

A reconstruction of the tumour to show the relative vascularity of the different areas of the tumour.

naked eye these are recognisable as distinctive from the tumour tissues, and they can be separated with ease from the main growth. Microscopically, tubules and glomeruli may be recognised, but the tissues have suffered from displacement and compression. It is obvious that these structures possess no active physiological function.

The position of the kidney at the poles of the tumour is the result of a gradual intracapsular displacement by the developing tumour tissue.

(*b*) *The Acinar or Adenomatous Tissue.*—With the exception of an area in the centre, the main bulk of the tumour is composed of an acinar or adenomatous tissue. The acini show

a wide variety of shape and size. The lining cells are cubical or columnar, no basement membrane is apparent, and the acinar cavity contains a mucoid-like material, apparently derived from the lining cells.

The acini are arranged in a compact fashion, with a very small amount of supporting connective tissue.

The degree of vascularity is slight, and the blood-vessels which exist are primitive in structure.

The whole appearance of the tissue, the nature of the existing blood-vessels, the histological character of the acinar cells, and the structure of the inter-acinar connective tissue are convincing evidences that this portion of the tumour has been embryonic in origin.

The Probable Origin of the Adenomatous Tumour Tissue.—This is a question which very naturally arises, and without unnecessarily belabouring what most probably must remain hypothetical, I shall briefly state what appears to me to be the likely source of the origin.

In the paraxial region of the dorso-lumbar portion of the embryo, there are several embryonic structures which may conceivably have been the source from which the tumour formation originally sprung. There is this certainty, however, to work upon—the original tissue was mesoblastic in type. I say so because, as I shall presently show, the adenomatous tissue tends to revert in certain portions of the tumour to a mesoblastic tissue. For this reason, I believe one can exclude an epithelial formation, such as the epithelium which lines the embryonic neural canal (Busse). For the same reason, it would appear reasonable to exclude the Wolffian tissue, for I am informed that according to the most recent teaching of the embryologist, the cells of the Wolffian body are hypoblastic in origin, being derived from the cells lining the cœlom.

Of the structures of mesoblastic origin, there are three possible sources—the myotome, the sclerotome, and the mesoblastic nephrogenetic cells of the metanephros or true kidney. The position of the tumour as an intrarenal growth and the acinar character of the tumour cells make it extremely unlikely that either the myotome or sclerotome are the responsible tissues. If other proofs had been wanting, one might reasonably adduce by the method of exclusion that these tumours, in so

far as their adenomatous structure is concerned, have their origin in the specialised cells of the metanephros or permanent kidney. But subsidiary proofs are not entirely absent. The tumour from its earliest beginnings has been an intrarenal development, and, moreover, it has apparently been central in distribution, judging by the position of the renal tissue at the poles. Further, the adenomatous tissue, while apparently epiblastic or hypoblastic in arrangement, is certainly developed

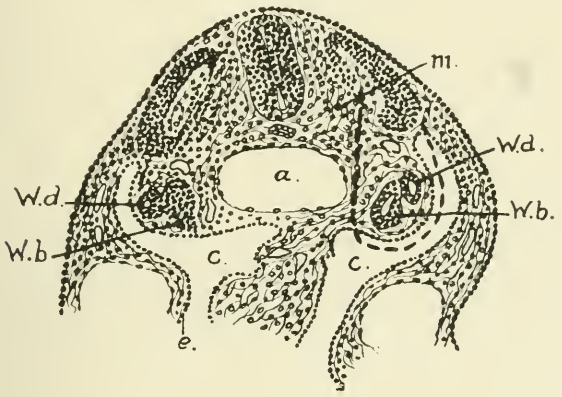

FIG. 9.

Rabbit embryo of eleventh day: after Bryce.
W.d. Wolffian duct. *W.b.* Wolffian body. *c.* Cœlom.
The area from which the tumour may conceivably develop has been enclosed in a dotted line.

from a mesoblast source, and such a source is to be found in the mesoblastic nephrogenetic cells of the metanephros.

I believe that the reason why the nephrogenetic cells take on a tumour formation depends upon an error in the blood supply of the metanephros. The nephrogenetic cells, by a process which I need not detail, ultimately form the convoluted tubules. At one extremity they become united to the collecting tubules through the medium of the junctional tubules. At the other extremity, the invagination of a capillary loop into the tubule forms the future Malpighian corpuscle.

I have satisfied myself that a striking feature of the morbid anatomy is the imperfect blood supply of the affected kidney.

Further, throughout the tumour, except in the caps of true

kidney tissue at each pole, there is no evidence of any attempt at the formation of glomeruli.

Therefore it seems to me that the possible sequence of events has been somewhat as follows:—The imperfect blood supply has prevented the formation of Malpighian corpuscles, the proper function of the convoluted tubules has failed to develop, and there has been a prostitution of their function, which has resulted in a tubulo-acinar tumour formation. Such is the hypothesis which I have worked out to my own satisfaction, and I realise that the best that can be said for it is that it is an hypothesis.

(*c*) *Sarcomatous Tissue.*—When the cut surface of the tumour is examined as a whole, it is found that the sarcomatous tissue in its most perfect state is localised to an area which roughly corresponds to the centre of the growth. Around the area of pure sarcomatous tissue there is a zone composed partly of adenomatous tissue and partly of sarcomatous tissue. In a more peripheral area there are scattered collections of sarcomatous tissue, small in extent, and quite unconnected with the central area. In fact, the distribution picture which the sarcomatous tissue shows is one of three zones: a central area of fully developed sarcomatous tissue, an intermediate zone of adeno-sarcomatous tissue, and a peripheral zone of adenomatous tissue with a few scattered foci of sarcoma cells.

The Source of the Sarcomatous Tissue.—The sarcomatous tissue develops directly by a process of metamorphosis from the adenomatous tissue. The process may be seen in all stages. It is an interesting example of what at first appears to be a conversion of an epithelial tumour into a mesoblastic sarcomatous one, a conversion which, with our present knowledge, is generally believed to be impossible. But when one considers the origin of the tissues in both instances, one finds that the situation is by no means such an irreconcilable one, for it is merely the reversion of a specialised mesoblastic tissue into one of more simple type.

The original adenomatous tumour is one of low vascularity, but with the establishment of the sarcomatous change, the blood supply becomes enormously increased. The blood-vessels are of a primitive structure, being merely blood-filled spaces among the tumour cells.

From the central area, where the sarcomatous change first

becomes apparent, the degeneration extends outwards in a centrifugal direction, and at varying distances towards the periphery isolated areas of sarcomatous tissue may be noted. Eventually nodular deposits of sarcomatous tissue make their appearance in and around the capsule of the organ, and when this stage is reached, the dissemination rapidly extends to the surrounding organs and tissues.

(*d*) *Non-striped Muscular Tissue.*—In the specimens which I have examined, it has not been my experience to find a wider spread and general distribution of non-striped muscle, though certain observers have described such.

When a systematic "block" investigation was made of the tumour, it has been found that the non-striped muscle is limited in its occurrence to an area which roughly corresponds to the

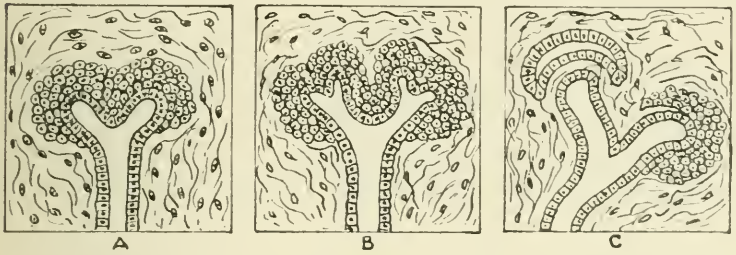

FIG. 10.

A diagram to illustrate the formation of the convoluted tubules from the mesoblastic nephrogenetic cells.

pelvis of the original kidney, that is to say, an area of the mesial edge, about its centre. The muscular tissue is broken up into small clusters of fibres separated by varying intervals of tumour tissue, and when the tumour is remodelled on the microscopical basis, it is found that the outline of the muscular groups is that of a long pointed oval, in the shape of which a resemblance to the pelvis of the kidney may still be traced.

It would seem, therefore, that the non-striped muscle which exists in the pelvis of the kidney has been the source of a similar tissue in the renal tumour.

As the adenomatous tumour formation advances, it involves the tissues of the renal pelvis, and it has the eventual effect of

breaking up the muscular ring into isolated groups of muscular fibres.

The muscular tissue is therefore not a part of the tumour formation.

(*e*) *The Connective Tissue.*—The whole tumour is permeated with a loose fibrillar-like network of connective tissue fibrils. In addition, there are septa of a dense nature which radiate from the position of the kidney pelvis and which tend to divide the tumour into a series of arc-like divisions. Beyond these facts, the connective tissue possesses no distinctive features.

(*f*) *The Blood-Vessels.*—If the tumour is examined in its early stage while the bulk of its tissue is adenomatous in structure, one is impressed by the small degree of vascularity relative to the size of the growth. The blood-vessels which exist are imperfectly developed, and even in the larger sizes the vessel walls are often composed of an endothelial lining with a thin connective tissue backing.

When the tumour undergoes a sarcomatous change, the vascular picture alters in so far as the vascularity becomes vastly increased, the smallest blood-vessels become distended to many times their original size, and there is a free formation of new vessels. The vascular change is in keeping with the rapid cell production and division which characterises the sarcomatous tissue.

The Method of Spread and Metastasis of the Tumour.—In two cases I have had an opportunity of studying the method of dissemination of the growth. There are two ways, by either or by both of which the tumour may extend. The first and earliest method is by the blood-stream, and more especially *via* the veins; it is therefore a pure metastasis. The tumour tissue which is so disseminated may consist of adenomatous or of sarcomatous tissue. The former occurs in the early stages of the tumour, the second in the more advanced tumour formations. The main interest, however, of the dissemination lies in the fact that whenever an adenomatous metastasis occurs, it eventually undergoes a conversion into sarcomatous tissue. This is a fact beyond all question, and it affords an additional proof of the statement which was made regarding the conversion of the adenomatous into sarcomatous tissue in the original tumour. Secondary deposits have been found in the kidney

of the opposite side, in the liver, in the lungs, and in the central nervous system.

The second method of spread is by infiltration, and I believe that it is the sarcomatous tissue alone which possesses this power. Eruptions occur at varying points in the tumour capsule, and the perinephric tissues are rapidly invaded. Deposits of tumour formation in the omentum are always sarcomatous in character, and they are not metastatic in origin but infiltrative, the omentum having been invaded at these points when it has lain in contact with the anterior surface of the tumour.

Summary of the Pathological Findings—The Origin and

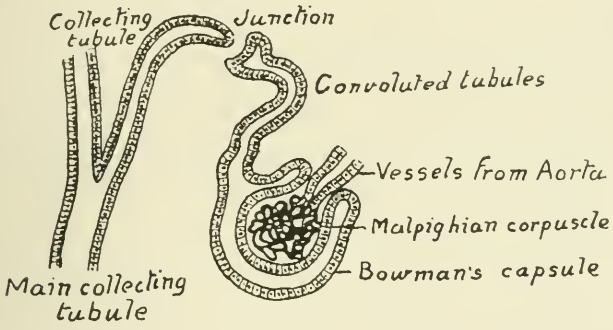

FIG. 11.

A diagrammatic representation of the development of the convoluted tubules.

Development of the Tumour.—I. The tumours have been examined by the "block" method, the advantage of which has been to give a pictorial idea of the distribution of the tumour tissues, and the changes which these tissues undergo.

II. Six different varieties of tissues are met with in a tumour of a moderate degree of development—renal tissue, adenomatous tissue, sarcomatous tissue, non-striped muscular tissue, connective tissue, and vascular tissues.

III. The renal tissue has been gradually displaced by a tumour formation which originated within its interior, so that it eventually appears as a thin cap-like area of tissue upon both poles of the tumour.

IV. The adenomatous tissue forms the original tumour tissue. It develops within the interior of the kidney, and I believe that it originates from a group of nephrogenetic cells which, instead of developing into the tubules of the kidney, take on an erratic growth, and so give rise to the adenomatous tissue of the tumour. I further believe, though on this point I cannot show definite proof, that the origin of the erratic growth depends upon an error in the development of the renal vessels. The adenomatous tissue does not infiltrate the renal tissue, but gradually pushes it aside.

V. The sarcomatous tissue results from a metaplasia of the adenomatous tissue. The change occurs in the centre of the adenomatous tissue, and it gradually extends until the adenomatous tissue is entirely replaced by the sarcomatous formation.

VI. The non-striped muscle is derived from the muscular tissue which normally occurs in the kidney pelvis. Its distribution is limited to an area in the centre of the mesial edge, though in the more extensive growths the infiltration of the tumour tissue produces a wide separation of groups of the muscular fibres.

VII. The blood-vessels remain of a primitive structure. While the tumour is adenomatous, the degree of vascularity is small. With the development of the sarcomatous change, the vascularity greatly increases.

VIII. The tumour passes through an evolution from a tumour of low malignancy (adenomatous tissue) which remains encysted and does not infiltrate into a tumour of high malignancy (sarcomatous tissue) which grows with great rapidity and infiltrates incessantly.

The Co-relation of the Clinical and Pathological Findings.—In discussing the clinical features of these tumours, I drew attention to certain distinctive points, and I then promised to review these in the light of the pathological changes.

The General Outlines of the History.—The tumour in its beginning is an encysted one, and it is only after a certain period has elapsed that it acquires the characters of a highly malignant sarcomatous type. Therefore, one can understand the characteristic outline which the clinical history reveals. As long as the tumour remains of the encysted and comparatively

simple type, the symptoms are extraordinarily few, even though the tumour may have reached a great size.

With the appearance of the sarcomatous change the picture alters, the tumour grows more rapidly, general wasting appears, and it is at this stage that pain may make its appearance. I need hardly point out the importance of surgical interference, if possible, before the second stage makes its appearance.

The Urinary Symptoms—*Hæmaturia.*—It is most important to recognise that in well-established tumours of this type, blood is not present in the urine. I have used the term "well-established tumours" because it would seem that in the early stages of the disease, probably before the kidney tumour is palpable, hæmaturia may occur. In one of the cases under review there was good evidence of its presence. What is the explanation of such a sequence? Hæmaturia is not a feature in well-established cases of the disease, for the very excellent reason that no channel exists by which the blood can make its way to the surface.

In discussing the gross pathology, I described how the developing tumour leads to a disappearance of the calyces, how it obliterates the pelvis of the kidney, and eventually entirely occludes the upper end of the ureter. No channel, therefore, remains through which blood from the tumour can make its way to the surface.

On the other hand, in the early stages of the disease, the tumour is a small one, situated in the centre of the kidney substance. Further, it is reasonable to assume that at this early stage the calyces, pelvis, and ureter are patent, and therefore any blood which may be derived from the tumour will be carried along the usual channels.

In view of these facts, I can understand that in early cases hæmaturia may be present, while in well-developed tumours it is practically a physical impossibility that such a feature could appear.

The Secretion of Urine from the Affected Kidney.—One of the most striking features in the pathological examination of a well-developed tumour is the displacement and subsequent absorption of the true kidney tissue. It is recognisable as a thin encasing area of tissue, and while the presence of glomeruli and tubules might suggest a persistence of the secretory function,

it is unlikely that it has any physiological activity whatsoever. Moreover, it is cut off from the kidney, pelvis, and the upper end of the ureter by a wide area of tumour tissue which must necessarily prevent any communication between the renal tissue and the exterior. For these reasons, taken in conjunction with the feature already demonstrated, that the upper end of the ureter is unconnected with calyces and is blocked with tumour tissue, I believe that coincident with the tumour having reached a moderate degree of development, the kidney tissue on the affected side ceases entirely to functionate. Therefore it is not surprising that examination of the urine in those cases gives a negative result, because the urine is being entirely produced by the healthy kidney.

Diagnosis.—A rapidly growing tumour in the lumbar region of a child, with symptoms of emaciation and cachexia, usually means a tumour of the kidney.

This point having been established, two factors suggest that one is dealing with an embryonic mixed tumour. These factors are: (1) The absence of hæmaturia, except occasionally in the early stages of the disease. (2) The uniform enlargement of the whole outline of the kidney.

Certain extrarenal conditions may simulate the disease. A rapidly growing mass may be malignant disease of the retro-peritoneal glands. The tumour of the kidney has a lateral position, while the glandular mass is centrally located, and it has an area of resonance around it. Renal tuberculosis must be thought of, but the tuberculous kidney in the child never reaches to any great size. The kidney outline is irregular, and characteristic signs are generally present in the urine.

Splenic enlargement due to leucæmia, syphilis, and malaria, will have to be differentiated. It is well to remember that the anterior border of the spleen is sharp, that there is no zone of tympany between the tumour and the spinal column, and that the colon does not pass in front of the spleen. An examination of the blood will frequently lead to the correct diagnosis.

Hydronephrosis is very rare in children. It develops slowly, and it rarely reaches the large size of renal growths. Sudden changes in the size may occur in the case of a hydronephrosis.

Ovarian tumours are so rare in children that they may be practically disregarded, and the same is true of echinococcus.

FIG. 12 (×60 diam.).

The appearance of the renal tissue at the poles of the tumour. The tubular structure has been compressed beyond recognition, but the glomeruli are still apparent.

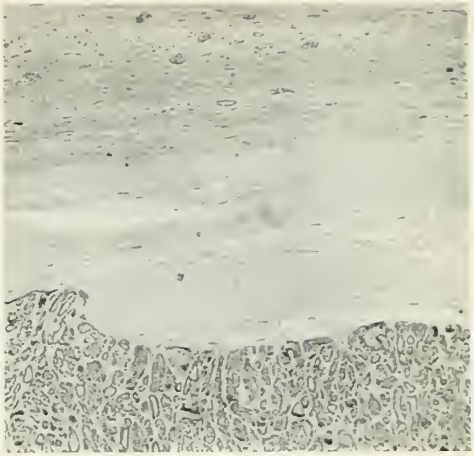

FIG. 13 (×28 diam.).

The junction between the renal tissue and the adenomatous tumour. There is no evidence of infiltration of the kidney tissue.

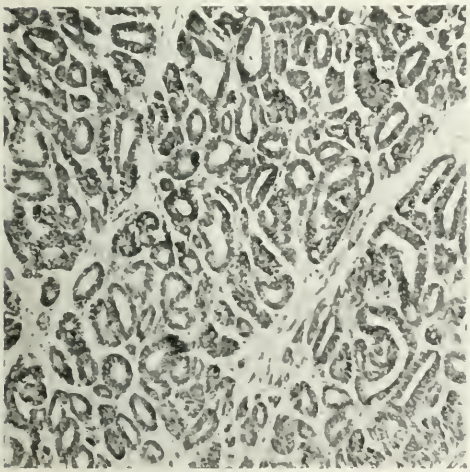

FIG. 14 (×90 diam.).

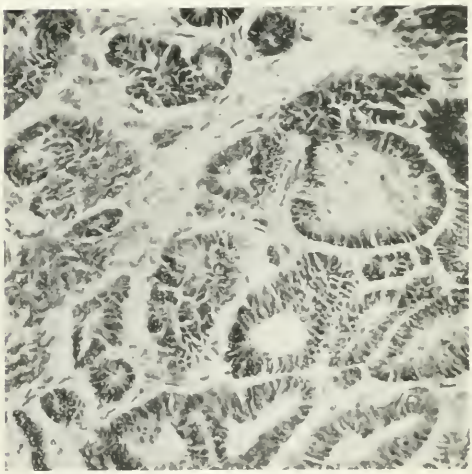

FIG. 15 (×200 diam.).

Figs. 14 *and* 15.—The appearance of the adenomatous portion of the tumour.

(*For page* 122.

Tumours of the liver are rare in children. In such cases jaundice is likely to be present, but one must be careful that a tumour of the right side under the ribs, accompanied by jaundice, is not a renal growth which has compressed the bile ducts. In liver enlargements the anterior border is distinctive in so far as it is well marked and extends in a lateral line across the abdomen.

Tuberculous peritonitis is sometimes difficult to differentiate; the presence of fluid in the abdomen is possible with both diseases. The family history may be of assistance, and so likewise the occurrence of tuberculous foci in some other part of the child's body.

Treatment.—Some years ago operation was not recommended for tumours of this description, the operation mortality was so great and the risk of recurrence so considerable. In later years, with a better and earlier selection of cases, the mortality from the operation has been very much reduced. Operative interference, of course, offers the only possible chance of recovery.

Without exception the transperitoneal route has been used, and the vertical Langenbeck incision has been preferred to the transverse one. In the cases which have come under observation, the lumbar route was impracticable on account of the size of the tumour.

The operations were performed in the Trendelenburg position. It gives great assistance in exposure of the field, and by conserving the blood in the vital organs of the body, it tends to diminish the degree of post-operative shock.

In operating on children, the conservation of blood is a most important detail, and in no operation is this necessity more evidenced than in the procedure we are describing. Every effort should be made, therefore, to avoid the loss of blood by the free use of artery forceps, etc.

After the abdomen is opened and the overlying viscera displaced, the peritoneum over the tumour to the outer side of the colon is incised and stripped inwards, the bowel being carried with it.

When operating on the right side of the body, care must be exercised in separating the duodenum from the anterior surface of the tumour; it adheres more closely than the peritoneum, and the thin walled bowel may be torn. It is generally an easy

matter now to shell the tumour out of the bed in which it is lying. The vessels are clamped, ligatured, and divided. Lifting up the tumour, the ureter is followed downwards for some distance and divided at as low a level as possible. The retro-peritoneal space is shut off by suturing the divided parietal peritoneum. Care must be bestowed on the suturing of the abdominal wound. In small children the healing of such an extensive wound is weak and delayed. If continuous deep catgut sutures are used, therefore, they ought to be reinforced by interrupted through and through sutures of silk-worm gut, threaded superficially on pieces of thin rubber tubing to prevent "cutting in" of the stitch.

Careful treatment is demanded of the post-operative shock which necessarily results. Active stimulation will probably be necessary, and an inclined position should be maintained until the shock has passed away.

Prognosis and Results.—Any evidence of secondary infection naturally renders operative interference out of the question.

Evidence of irregularity or nodulation of the outline of the tumour adversely affects the prognosis. Stated in pathological terms, nodulation means that the sarcomatous change in the interior has begun to make its way by various eruptions on to the surface of the tumour, and such a development naturally involves a very grave prognosis.

Wasting and loss of body weight are general evidences which are easily appreciated. They must be taken to mean a sarcomatous change in the tumour, and they therefore indicate that the future outlook is serious.

The immediate mortality of the operation, according to Döderlein and Birch-Herschfeld,[9] is 40 per cent. Walker[10] gives a mortality of 36 per cent. in 74 operative cases. Albarran and Imbert[11] find that the mortality is progressively less the later the statistics. The following table shows this clearly :—

	Cases.	Deaths.	Per cent.
From 1876 to 1890 . . .	34	18	52
„ 1890 „ 1895 . . .	32	7	21
„ 1895 „ 1902 . . .	90	23	25

It is interesting that in the younger groups of children the mortality is lower than in those of greater age. Albarran and

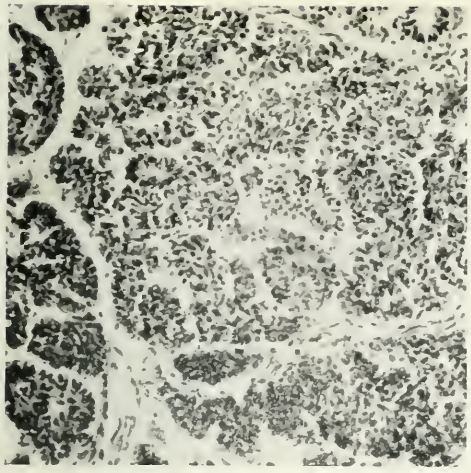

FIG. 16 (× 200 diam.).

The appearance of the adeno-sarcomatous portion of the tumour.

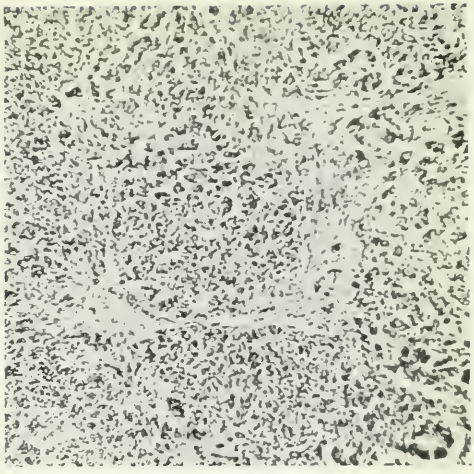

FIG. 17 (× 90 diam.).

The sarcomatous tissue from the centre of the tumour.

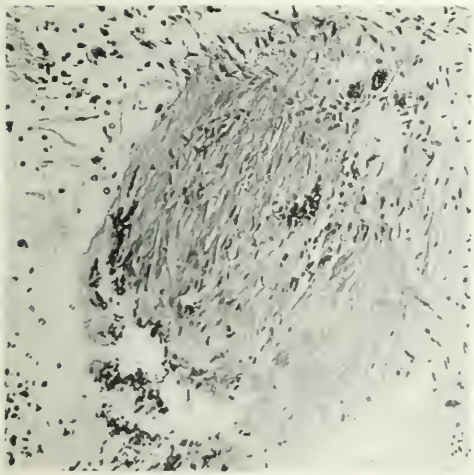

FIG. 18 (× 140 diam.).

An area of non-striped muscle.

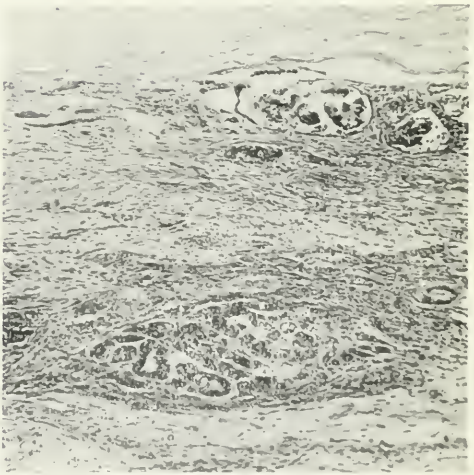

FIG. 19 (× 90 diam.).

Metastatic growths in the overlying omentum. They are originally adenomatous in structure, but they are undergoing a sarcomatous degeneration.

[*Face page* 124.

Imbert[12] in a list of 41 cases, in which the age was two years and under, found five operative deaths, a proportion of 12·2 per cent.

My own experience has been a very limited one. Only seven cases have been dealt with. Three of these were unsuitable for operation on account of extension of the growth. In the four cases, which were treated by complete removal of the tumour, there was no post-operative fatality.

The disease is apt to recur even after a most thorough operation, and of the four cases in the series which made a post-operative recovery, only one still survives, and two years have now elapsed since this case was submitted to operation.

My thanks are due to Professor James Ritchie for his careful criticism of that portion of the paper which deals with the pathological aspects; and to the Carnegie Trust for a grant towards the cost of reproducing the illustrations.

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DISCUSSION.

Sir Harold Stiles thought the Society was to be congratulated on having among its members a man who was both a Surgeon and a Pathologist. The reason why tumours had not been analysed was that they were examined in most cases by Pathologists rather than by Surgeons. Mr Fraser took a clinical interest in the subject as well as a pathological interest, and had a definite object in view when examining the tumour. He probably started by trying to explain the clinical symptoms. Sir Harold himself remembered examining such tumours on different occasions and being puzzled by them, but concluding in the end that they were mixed tumours. There were many very interesting and most valuable points in Mr Fraser's address

regarding the tumours; he had explained a difficult subject and made it simple and intelligible.

Mr Miller was extremely interested in what he thought perhaps the most important part of Mr Fraser's address—namely, the relationship between the blood supply and the growth of malignancy. He would be very interested to see some of Mr Fraser's specimens.

2. NOTES ON AN OPERATION FOR LARGE MIDLINE VENTRAL HERNIA

By GEORGE CHIENE, M.B., C.M., F.R.C.S., Senior Assistant Surgeon, Edinburgh Royal Infirmary

I PROPOSE to submit for your approval or criticism an operation for large midline ventral hernia. I first performed the operation in January 1911, and have since shown cases at clinical meetings of this Society. Drawings of the steps of the operation were demonstrated at the British Medical Association Meeting in Aberdeen just before the outbreak of war.

It may be advisable first to draw attention to the treatment at present in vogue for the condition. The problem before the surgeon is that the recti muscles of the abdominal wall are widely separated, the peritoneum protrudes between the muscles, the only coverings of the abdominal contents are a thin layer of peritoneum covered by stretched skin with little or no subcutaneous tissue.

The treatment may be palliative or operative, but the latter is gradually taking the place of the former in all cases otherwise suitable for operation. The palliative treatment, consisting of some form of abdominal support, is not, as a rule, satisfactory. The operative treatment consists in an attempt to close the defect by drawing the recti muscles and their fibrous sheaths together by simple or overlapping sutures, or, in cases in which the gap in the abdominal wall is large, by planting a metal filigree. Personally, I am strongly opposed to the latter method if the patient's own tissues can, in any way, be used for the same purpose; and I think they can.

We are not at present considering cases of umbilical hernia, for which William Mayo's overlapping operation, now so well known, is frequently employed, but herniæ which usually occur after operations performed through long midline incisions. It has been stated that the linea alba was designed so that surgeons might have an ideal route through which to explore the abdomen—nevertheless, herniæ do occur in this situation.

Discounting for the moment the use of the filigree, the operation most usually employed is to pare the fibrous edges of the opening and then to suture the various layers of the abdominal wall like to like, or, when possible, strengthening the line of suture by overlapping the various layers. The latter method is usually found to give better results if it can be carried out. It should be remembered, however, that, during the formation of the hernia, a tug of war has been going on between the two groups of oblique muscles of the abdominal wall. Frequently this lateral pull has caused so much separation that great difficulty is met with when an attempt is made to close the opening; the result is that there is marked tension on the sutures, whether they be simple or overlapping. This tension is so great that sooner or later a recurrence of the hernia not infrequently takes place.

The object of the present operation is to minimise the above difficulties: in the first place by diminishing the lateral pull of the oblique muscles of the abdomen, and in the second by strengthening the midline sutures by the addition of another layer of fascia. Its accomplishment is aided by the fact that the external oblique muscles do not fuse with the anterior fibres of the internal oblique at or near the outer border of the rectus as is usually supposed, but can be separated from the latter to near the middle of the muscle. Separation will be found difficult only at the tendinous intersections in the upper part of the muscle above the umbilicus, but this can be overcome by a little undercutting.

The hernial contents having been dealt with in the usual way and the fibrous edges of the hernial opening having been pared, so as to demonstrate the various abdominal layers, the skin and subcutaneous tissue are freely undermined as far as, or just beyond, the outer border of the rectus muscle on either side; two vertical incisions are then made at this point parallel with

the outer border of the rectus muscle through the aponeurosis of the external oblique. Those incisions should extend at least an inch beyond the upper and lower limits of the hernial opening. Secondary horizontal incisions are then made at the upper and lower ends of the vertical incisions. By dissection towards the middle line two flaps of fascia are formed with their hinges about the middle of the anterior sheath of the rectus muscle.

The vertical incisions through the aponeurosis of the external oblique muscles at once diminish the tension or lateral pull of the oblique muscles. When the edges of the wound are drawn together two large ovoid gaps are formed in the external oblique, through which the internal oblique is exposed to view. After the various layers of the abdominal wall have been sutured the fascial flaps formed from the external oblique overlying the outer border of the rectus muscle are turned inwards, overlapped, and sutured in the middle line, which is thus considerably strengthened.

Anyone who is accustomed to perform the operations usually employed for this condition and who cares to try the method just described, will at once be struck by the comparative ease with which he is able to draw the lateral margins of the wound together.

The question will at once suggest itself—what about the gaps formed in the external oblique; do they not cause a weakness in the abdominal wall at the outer border of the rectus muscle? Undoubtedly they do, as there are only two layers of muscle at this point instead of three, but in the cases I have operated upon no harm has resulted.

The main purpose of the operation just described is to minimise the lateral pull on the wound by the oblique muscles, but, by utilising the fascial flaps in the way I have suggested, the midline sutures are considerably strengthened.

Discussion.

Professor Caird thought there was always difficulty in closing up the opening in these cases, and that better results were obtained by using the method Mr Chiene had just described, especially if the gap were very big. He referred to a very serious case he had had where the patient had recovered after

this operation had been performed. The difficulty in this case had been in bringing the edges of the recti together in the midline.

Sir Harold Stiles said he had used Mr Chiene's method several times, and described his own experiences in performing the operation, which was really a very simple one, based on the fact that if it was done in the way described by Mr Chiene, it was almost always bound to be successful. The real difficulty was the pull of the lateral muscles. When the operation was finished the recti muscles slid in very easily. The wider the hernia the more breadth of rectus was used.

3. ACUTE APPENDICITIS AND ACUTE APPENDICULAR OBSTRUCTION

By D. P. D. WILKIE, M.Ch., F.R.C.S.

THE practice of submitting patients suffering from acute appendicular disease to early operation has of late years afforded surgeons the opportunity of observing the pathology of the initial stages of the disease. This study has shown that altogether different primary lesions may, if permitted to develop, lead to the same final result of perforation and peritonitis. To attain to accuracy in early diagnosis, it is essential that we learn to correlate the initial symptoms with the primary lesions—in other words, to have a rational basis of pathology on which to found the symptomatology of the disease.

My personal observations on the subject have led me to classify the acute diseases of the appendix according to the following types :—

1. Acute inflammation of the wall of the appendix.
2. Acute obstruction of the lumen of the appendix.
3. Perforating ulcer of the wall of the appendix.
4. Acute inflammation with secondary acute obstruction.

Type 3 is well recognised as giving rise to a fulminant attack with peritonitis. In it an ulcer, usually associated with the presence of a concretion, perforates with little or no warning,

and, as there are frequently streptococci as well as the colon bacillus present in the ulcer, a dangerous type of peritonitis supervenes.

My main object in this paper, however, is to draw attention to types 1 and 2, and to endeavour to establish their fundamental differences both as regards pathology and symptomatology.

The wall of the appendix, being rich in lymphoid tissue and exposed to a content full of micro-organisms, is particularly liable to attacks of inflammation just as are the tonsils. As might be expected, primary inflammation of the wall of the appendix is associated with malaise, a certain rise of temperature and of pulse-rate, with nausea and, it may be, vomiting, and with pain more or less severe in the lower abdomen gradually settling on the right side as the parietal peritoneum in that region becomes irritated. The appendix being a hollow viscus is, however, also liable to have its lumen obstructed, and I hope to show that a sudden obstruction of the lumen of the appendix may, under certain conditions as regards its contents, lead to changes much more striking than those associated with inflammation of its wall, and moreover that these changes produce a train of symptoms distinct from those of inflammation, and such as one would expect in obstruction of a blind hollow viscus.

My attention was first directed to this essentially obstructive type of lesion eight years ago by the case of a man who at 5 P.M. one evening was seized with acute abdominal pain which doubled him up; the pain lasted for half an hour and then passed off, only to return an hour later accompanied by vomiting. From that time the pain remained, but was accentuated from time to time by severe spasms. Seen by his doctor at 8 P.M. he had severe pain, but his pulse and temperature were normal. When I saw the patient at 10 P.M. he was doubled up with pain, which he located in the umbilical region. There was marked hyperæsthesia of the whole of the right side of the abdomen. His temperature was 99° F. and his pulse 80. Diagnosing a perforation, probably of the duodenum, I opened the abdomen at 11.30 P.M. The duodenum and stomach were normal, but a large tense and distended appendix was felt and was

removed through another incision. The wall of the appendix was stippled with points of gangrene except the proximal ½ inch, which was of normal size and colour. On opening the distended appendix it was found to contain stinking fæculent material pent up beyond a concretion which was impacted in a stenosis half an inch from the cæcal end. Here one was obviously dealing with an acute obstruction and not an inflammation, and the question arose—will a complete obstruction of the lumen of the appendix containing fæcal matter lead *per se* to the rapid and striking pathological changes met with in this case? The question was one readily lending itself to experimental investigation. Accordingly a long series of experiments was carried out on cats and rabbits to endeavour to settle this point.

Experimental Appendicular Obstruction.

In rabbits a rubber ligature was tied round the proximal end of the appendix without interfering with the blood supply of the organ. In a certain number of rabbits the empty appendix was obstructed in this way, in others a small amount of fæcal matter was introduced from the cæcum before applying the ligature; in a further series a considerable amount of fæcal matter was introduced.

The result of ligation of the empty appendix was to produce a mucocele of the organ, the health of the animal not being interfered with to any appreciable degree.

When a very small amount of fæcal matter was present at the time of ligation an empyema of the appendix resulted, the organ becoming gradually more and more distended with pus and in some cases perforating.

When a considerable quantity of fæcal matter was introduced rapid gangrene with perforation of a portion of the wall followed with a fatal result within twelve to forty-eight hours.

In view of the purely vegetarian character of the diet of the rabbit, and the readily fermentable character of the cæcal content of that animal, together with the relative fragility of its intestinal wall, it was decided that experiments on a mixed-feeder such as the cat with its muscular intestinal wall

would give a better field for comparison with the conditions in the human subject. The cat, not possessing an appendix, had to be furnished with an artificial one. This was done by isolating the last coil of ileum, which is rich in lymphoid tissue, restoring the continuity of the intestinal tract. The behaviour of this isolated coil of ileum was then observed (1) when left empty; (2) when containing a small quantity of fæcal matter; (3) when more or less full of fæcal matter. The results were the same, but were even more striking than in the experiments on rabbits.

The empty loop formed a mucocele; the loop containing a small amount of fæces an empyema, which eventually ruptured if left; whilst the loop containing a considerable quantity of fæcal matter became rapidly gangrenous. When the loop was filled with an emulsion of intestinal bacteria grown on culture, no striking changes supervened although in some cases it slowly filled with a muco-purulent content.

Decomposition of fæcal matter appeared to be the factor inducing the rapid pathological changes met with in the group of rapidly fatal cases. It was found, moreover, that the gangrene was more rapid and pronounced if the animals had previously been fed on a rich proteid diet than if they had been given a more purely carbohydrate diet, *e.g.*, porridge and milk.

The pathological changes seen in these experiments resembled so closely those seen in certain cases of acute appendicular disease in the human subject that one ventured to assert that the primary factor, namely obstruction, must be the same in both.

A mucocele of the human appendix is a condition occasionally met with owing to an obliteration of the proximal end, the result of a preceding attack of inflammation. As in animals, it causes, as a rule, few if any symptoms.

An empyema of the appendix is also met with, and in my experience has been associated with the plugging of a stenosis or kink in the appendix near its cæcal end by a concretion. Complete gangrene of the appendix is a fairly frequent finding at operation, and has by many been attributed to a thrombosis of the vessels in the meso-appendix. Whilst thrombosis is sometimes, present I am convinced that it is an effect and not

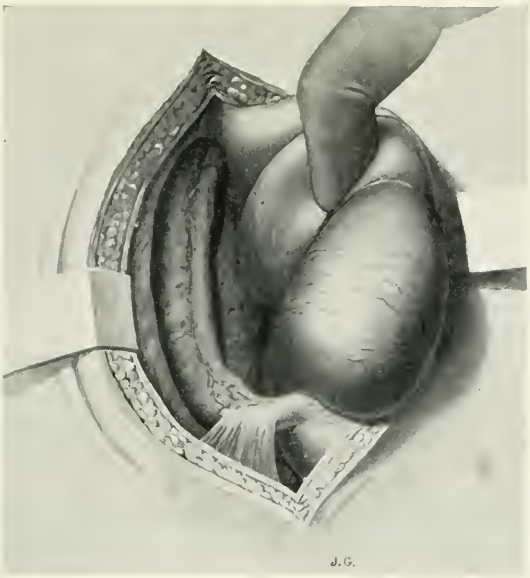

FIG. 1.

Acute obstruction of a retro-cæcal appendix. Cæcum pulled forward showing the dark distended appendix. A concretion was impacted in the kink, produced by the adhesion near the proximal end.

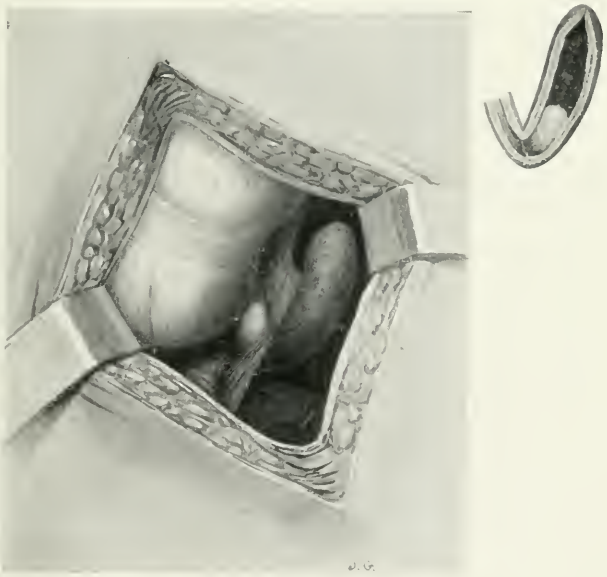

FIG. 2.

Acute obstruction of the appendix. Kink produced by genito-mesenteric fold. Inset: Longitudinal section of the appendix showing concretion plugging the lumen at the kink.

[*Face page* 132.

the cause of the gangrene. If such an appendix be removed before perforation has occurred it will invariably be found to contain not pus but dark stinking fæculent material pent up under tension behind some obstruction of the lumen, and the condition appears to be strictly comparable to that in the experiments on rabbits and cats, where fæcal matter was locked up in the appendix, or in an isolated loop of intestine.

Causes of Acute Appendicular Obstruction.

The two common causes are the impaction of a concretion either in a stenosis the result of a previous attack of appendicitis, or at a kink in the appendix due to tacking down at some point by an adhesion (see Fig. 1) or a congenital fold of peritoneum. Of kinks the one most frequently encountered is that where the genito-mesenteric fold ties the appendix at some point, usually in its middle third, downwards towards the pelvic brim (see Fig. 2). Apparently in these cases the entrance and exit of fæcal matter to and from the distal part of the appendix is impeded by the stenosis or kink, and fæcal matter when it has gained entrance is liable to remain and become hardened to form a concretion. From time to time the concretion may lead to temporary and abortive attacks of obstruction, the patient experiencing appendicular colic. On one occasion, however, more fæcal matter gains entrance beyond the narrowed zone, the appendix contracts to expel it, but instead forces the concretion into the stenosis or kink. If the concretion does not disengage itself promptly the fermentation of the fæcal matter increases the tension behind it and effectively ball-valves the exit in a manner similar to that of a soda-water bottle. Progressive fermentation and distension with inevitable gangrene and perforation follow unless the process is cut short by surgical intervention.

Another cause of obstruction, of which I have recently encountered three examples, is carcinoma developing in the proximal end of the appendix. In one case this led to an empyema of the appendix distal to the growth; in another, where a concretion and fæcal matter were present, to gangrene and perforation.

Clinical Picture in Acute Appendicular Obstruction.

In some cases the sudden onset of symptoms so characteristic of the malady may develop without any previous history of trouble in the appendix region. In many cases, however, careful inquiry will elicit a history of intermittent colicky pains or of occasional "bilious attacks" with more or less pain in the right side of the abdomen. In a few cases "indigestion" after eating green vegetables has been the only previous suggestive symptom. The acute attack begins suddenly with acute pain in the umbilical region, frequently accompanied by vomiting. Whilst in a number of cases it has been noted that the pain commenced during or just after some physical exertion, in quite a large number it set in at night whilst the patient was in bed, waking him out of sleep. The pain is of an acute colicky nature, and to begin with is intermittent, coming on in spasms. After a short time, however, it is constant, but is aggravated by more acute spasms from time to time. Perforation of the distended appendix is commonly marked by a temporary relief from pain, the patient expressing himself as being much easier, although a rising pulse-rate indicates a spreading peritoneal infection. For the first few hours (it may even be twelve hours or more) there may be no rise in the temperature nor in the pulse-rate, and negative observations under these two heads must be disregarded entirely if early diagnosis is to be made.

The facies of the patient often gives help as it expresses anxiety, and he is usually conscious that there is "something wrong inside" and welcomes the suggestion of surgical interference.

For diagnosis, however, we must rely mainly on the physical examination of the abdomen. Cutaneous hyperæsthesia in the right lower quadrant of the abdomen is usually present in the early stages, although it may disappear once the appendix has perforated. Rigidity of the lower half of the right rectus muscle is almost always present, as is tenderness on pressure in this region. Most difficulty is encountered where the obstructed appendix is lying high up in the retrocæcal region, but even here some hyperæsthesia of the skin above M'Burney's point, together with tenderness in the lumbar region posteriorly, and

a normal urine incriminate the appendix. The importance of making a diagnosis on the local signs cannot be over-emphasised, because in these cases to wait for changes in the temperature or the pulse-rate so frequently means delaying until gross pathological changes have supervened and the danger zone has been entered.

Acute Appendicitis with Secondary Obstruction of the Appendix.

The combination of primary inflammation with secondary obstruction is unquestionably of frequent occurrence. In this case, the swelling and œdema of the coats of the appendix associated with a primary infection of the wall, narrow the lumen, and at some point may, with or without the aid of a concretion or a kink, occlude it. Muco-purulent content then collects distal to the obstruction, and gangrene, usually localised in this case, and perforation follow.

The symptoms in this type of case are, to begin with, those of a simple inflammation with some fever, a slightly accelerated pulse-rate, dull aching pain and local tenderness. When the obstructive element supervenes the pain becomes more acute, with the characteristic spasmodic exacerbations. Perforation, as in primary appendicular obstruction, is often associated with a relief from acute pain but with a progressive rise in the pulse-rate. If in the early stages of such a case there has been any doubt as to the necessity for operation, the onset of the more acute spasmodic pains is a signal for prompt surgical intervention.

Conclusions.

(1) Primary acute inflammation and primary acute obstruction of the appendix are distinct pathological and clinical entities.

(2) Complete obstruction of the lumen of the appendix near its cæcal end is followed by changes which depend on the presence or absence of fæcal content in its lumen: (*a*) obstruction of the empty appendix leads to a mucocele; (*b*) if very little fæcal matter is present, to an empyema; (*c*) if much fæcal matter is present, to gangrene and perforation.

(3) To recognise the obstructive cases in their early stages

the state of the temperature and pulse-rate must be ignored and diagnosis based entirely on the facies and the local examination of the abdomen.

Discussion.

Professor Caird said many men had a habit of looking on such cases of acute appendicitis as strangulated hernia. He thoroughly agreed with Mr Wilkie that in the series of changes it was not the pulse, temperature, etc., that helped in the diagnosis, but the presence of local tenderness. He wondered if leucocytosis was ever present in these cases described by Mr Wilkie. What was the state of the leucocytosis when a calculus was found before any lesion had taken place?

Professor Russell said that it was not the first time the Society had had the opportunity of judging of Mr Wilkie's scientific methods. He wished to endorse the great importance of one point—namely, the recognition of the importance of tenderness in the appendix region in the diagnosis. This was not a universal accomplishment; and there was no place where the discovery of tenderness was of greater importance to the patient. He thought local tenderness was always present in cases of appendicitis, and that this was only discovered by examination of the rectum and on deep palpation. He doubted if such cases ever occurred without antecedent warnings, and yet attacks of appendicular pain were often very apt to be overlooked. In some cases there were occasional attacks of abdominal pain, and examination of the cæcum showed that there was tenderness in that region; the attacks recurred and when the history was available his position had been that he had found that in these cases the appendix had had to be removed. He had seen cases where the appendix had been left even when this tenderness was present, with the result that an acute obstruction occurred. The idea that an appendix was always acute where there was a rise of temperature must be given up, as this was not always the case. He wished to draw Mr Wilkie's attention to the fact that sixteen years ago there was a very full and detailed discussion on this subject, and that he thought the report of the discussion would prove interesting reading to Mr Wilkie.

Mr Stewart thought that in some cases of appendicitis there was an undue amount of pain and tenderness. In some of these cases the appendix seemed normal, but when it was cut up a stenosis was found; in others gangrene was found, beginning at the site of the pain. He wondered if Mr Wilkie thought these were both the same type of case.

Mr Dowden was especially interested in the point brought out by Mr Wilkie of the great importance of the rôle played by fæcal matter. He was of the opinion that far too many cases still were allowed to go too far on before being medically or surgically treated.

Sir Harold Stiles wondered if Mr Wilkie could not establish a connecting link between the two types of cases. He referred to a type of appendicitis often seen in children, where the patients first became bilious, in nine cases out of ten this being the result of trouble in the appendix region. He had found that there was usually slight tenderness in the right iliac fossa, the lumen was slightly increased, the mucous membrane thickened, and a concretion was beginning to be formed. After removal of the appendix he had found that the bilious attacks, etc., had disappeared and complete recovery was established.

Mr Scot Skirving wondered how Mr Wilkie could be certain of the diagnosis of a case with no temperature, no pulse, but local tenderness and pain, and no doubt rigidity also. Did he exclude renal calculus?

4. THE DIAGNOSIS AND TREATMENT OF CALCULUS IN THE PELVIC PORTION OF THE URETER.

By HENRY WADE, M.D., F.R.C.S., Assistant Surgeon, Royal Infirmary; Surgeon to Leith Hospital.

As the majority of the cases on which this communication is based were examined by me when on service with the Army in the East, I purpose mentioning first of all the circumstances under which so large a number came under my care.

There are few indications of injury or disease that produce

more alarm in the mind of the layman of our race than the appearance of blood in the urine he voids. At the same time, the medical man in attendance on such cases realises that an accurate knowledge of the cause of the bleeding is usually impossible without the assistance of the centrifuge, the microscope, and the radiogram.

When, therefore, as occurred so frequently with us in Palestine, the Regimental Medical Officer had such a case, it was his custom to send his patient at once down the line for admission to hospital for diagnosis and treatment. The long single line of communication through the desert, and the numerous halting-places by the way, not infrequently meant that a full fortnight might elapse before he was admitted to one of the larger hospitals in Egypt, where a complete examination of his case could be carried out. In certain cases, by that time the patient was found to be apparently cured; but in view of the fact that the round trip back to his unit occupied frequently as long as five weeks, it was considered advisable in these cases to exclude finally the presence of a calculus or other more serious cause of the bleeding. To shorten this period, in the later stages of the war, centres where a complete examination could be carried out were formed closer to the troops in the field.

The incidence of hæmaturia was probably more commonly met with in the troops in the East than on any other front, and in the Egyptian Expeditionary Force great importance was attached to its occurrence, owing to the possibility of it being due to bilharziasis.

About 90 per cent. of the adult fellaheen population of Egypt suffer from this disease. They spend a great part of their life paddling in the water that irrigates their fields, and when there the minute cercariæ, liberated from the body of the infected snail, penetrate their skin, inducing the disease or leading to another reinfection.

Fortunately, few of our men were infected. A number of Australians, when encamped at Tel-el-Kebir, contracted the disease. A serious outbreak occurred among the troopers of the West Riding Yeomanry, who were infected when stationed in the Fayoum, and some men contracted vesical bilharziasis when quartered near Suez. Although the cases were few, all the troops stationed in Egypt, or those passing through that

country, were exposed to the liability of infection. We had therefore to be constantly on the outlook for the occurrence of the disease. Any case, therefore, of hæmaturia was examined most carefully, especially as it was not always possible to detect the ova in the urine.

The life led by the troops in the Desert of Sinai was such as to predispose unduly to the production of calculi. They existed on a limited water ration of half a gallon per man per day. This ration was for all purposes—drinking, cooking food, and washing. A bath in fresh water was therefore often unknown for weeks on end. The troops lived in the sandy desert where in summer the mid-day temperature frequently rose to 110° F. in the shade. They naturally perspired abundantly. Finally, their diet consisted of the usual army rations of bully beef, biscuit or bread, bacon, and tea. Oxaluria and calculus formation were under these circumstances not uncommon.

Many cases of this nature came under my care, and the material was so abundant we were able to establish a routine method of examination.

The cases were in the great majority ones of early disease and arrived with the provisional diagnosis of hæmaturia, oxaluria, renal colic, or renal calculus. Here I may mention that the incidence of oxaluria was greatly diminished as our accuracy in the diagnosis of renal and ureteral calculi increased.

The characteristic clinical indications of a stone in the ureter can be best illustrated by a typical case :—

CASE.—This officer was examined by me in consultation with Lieut.-Colonel Newton, Officer Commanding New Zealand Mounted Brigade Field Ambulance. Colonel Newton had been consulted by him on several occasions during the previous year for what was taken to be either attacks of oxaluria or calculus in the ureter. As these attacks had become more severe and more frequent, he came to Cairo for further examination, and treatment if necessary.

Colonel Newton provided the following notes with reference to his patient's health—"During the last year the patient has had about six definite attacks which have had much in common, but have presented certain points of difference. The leading features of a typical attack are as follow : vague malaise for

a few hours, followed by an acute attack of vomiting, abdominal pain, and backache. In from four to six hours after treatment the acute symptoms subsided, and a convalescence follows of two to seven days' duration. In the intervals between the attacks, the patient is in good general health and attends to his important duties in the field."

The leading features of the syndrome are: *Vomiting*—This is usually severe and bears no relationship to the taking of food which does not relieve the pain. The vomiting is frequently repeated. In one or two attacks it has only been a slight feature of his illness. *Pain*—This has been the most constant symptom. It is very severe and causes the patient to look drawn and anxious. The site of the pain varies. It frequently is most severe over the left lumbar muscles of the back. It is frequently abdominal, and this slightly in the epigastrium, but particularly in the lumbar region, but *never* the right half of the abdomen. In one attack the pain was so localised to the back that it suggested a very acute lumbago, but there was on this occasion very severe vomiting. The pain at certain periods descends towards the left groin, but not to the penis or testicles. The pain is relieved by the application of hot fomentations, but only after two or three hours of vigorous treatment. Shock is always a prominent feature of this case. The abdomen is always soft and flaccid. *Tenderness*—This is always present, being situated either in the lumbar region of the back or abdominally in the neighbourhood of the left kidney. The tenderness persists for from twenty-four to seventy-two hours. There is never any palpable abdominal swelling. *Diarrhœa*—This is never a prominent feature and possibly has resulted from the taking of purgative pills on the occasion on which it has occurred. There has never been melæna.

Urine—This has been examined on two or three occasions, and the following is the report of the analysis made by the Anzac Pathological Laboratory of a twenty-four hours' sample—"Quantity, 42 oz.; reaction, acid; sp. g., 1018; no blood or sugar; very faint cloud of albumen. The microscopic examination of a centrifuged specimen shows one or two epithelial cells; no blood cells; urates, and a few oxalate crystals."

The blood-pressure is raised during an attack. The patient is liable to colds and has twice had tracheitis. There are no

signs of tuberculous disease of the lungs. *Nervous System*—His knee jerks at present. The pupils react to light. His eyesight is satisfactory.

Frequency of Micturition—This has been a marked feature of one or two attacks, and was particularly evident during the last one. Patient's temperature is never raised.

The following is a report on the patient's health during an attack on May 22-23 :—

The patient suffered from malaise for two days before the 22nd. On the morning of the 22nd he was seized with acute diarrhœa. At 13.00 the patient complained of considerable abdominal pain and nausea. Vomiting commenced at 13.30. Frequency of micturition and pain on micturition was complained of at this time. On examination the abdomen was flaccid. No tenderness could be elicited. The skin was cold and sweating. The patient was obviously suffering from shock. His temperature was subnormal. Later in the day the patient complained of pain in the back.

When originally examined by me in consultation with Colonel Newton, the patient's history was taken to indicate the presence of a calculus in the left ureter. His general health was good, and the only physical sign detected was a palpable kidney which was prolapsed, but neither tender nor apparently unduly enlarged.

With a view to further examination, he was transferred to Nasrieh Schools Hospital, Cairo, under the care of Captain Duggan. The urine on examination was found to contain a few oxalate of lime crystals, but no red blood cells. After the customary preparation of the patient, an X-ray examination was carried out. The X-ray photograph of the left kidney showed no evidence of the presence of a stone. A photograph was taken of the bony pelvis, using the intensifying screen, which rendered the plate so granular as to make the findings uncertain, and in consequence another photograph was taken on account of two suspicious shadows seen in it. This latter photograph showed two distinct round shadows over the spine of the ischium on the left side, and above and to the inner side of these a faint irregular shadow. This irregular shadow was suspected to be due to a calculus in the pelvic portion of

the left ureter, and consequently further examination was carried out.

On *cystoscopic examination* the bladder wall appeared healthy. Both ureteral openings were normal. An X-ray ureteral catheter passed readily up the right ureter into the renal pelvis. On the left side the ureteral catheter entered the ureteral opening readily, but was arrested 2·5 cms. from the orifice. The catheters were therefore left in position, and another X-ray photograph was taken. This showed the faintly outlined shadow with irregular contour to be a calculus in the left ureter, the tip of the catheter lying in proximity to it where it had been arrested in its progress. The small circular shadows were demonstrated to lie some distance from the ureter and they were taken to be due to small circular phleboliths.

The renal secretions from both kidneys were collected for twenty minutes after the X-ray examination. The amount secreted on the right side was about one-third greater than from the left kidney. The examination, which was conducted under local anæsthesia, was followed by no discomfort or complications, and the state of affairs that existed was explained to the patient.

Further operative treatment for the removal of the calculus was contra-indicated; no further hospital treatment was considered advisable.

The patient elected to return to his duties in the field, where he was under the care of Colonel Newton. He was advised as regards his diet and he took with him two dozen bottles of Contrexeville water, obtained by local purchase in Cairo.

Four weeks after leaving hospital he had another mild attack that lasted for one day. During the advance on Jerusalem he had another attack, but although indisposed carried on with his duties. During the summer of 1918, when serving in the Jordan Valley and on the other side of the Jordan, he had good health, but, prior to the final advance in September 1918, he had a third and most serious attack, accompanied by visible blood in the urine.

During this period I saw him on several occasions, and he was in good health. After the Armistice, a final X-ray

examination was carried out, and the calculus was found to have passed into the bladder and to have been voided naturally.

The prominent features of a typical attack of renal colic due to a calculus in the ureter, as illustrated in this case, and borne out in many others, seem to be as follows :—

The profound general prostration that accompanies it, the patient looking obviously seriously ill.

The pain of a typical attack does not seem to radiate so frequently as is generally believed. Many complain only of severe lumbar pain. This is, however, usually confined entirely to one side of the body.

The associated frequency of a desire to micturate is in my opinion an indication of great significance.

When examined in the interval between attacks, the patient usually appears in perfect health. The only physical sign I found frequently enough to warrant being recorded was prolapse of the kidney on the side affected. Frequently it is palpable but not tender. This displacement is not difficult to account for, when the great engorgement of it that temporary obstruction of the ureter produces is realised. This increase in the size of the organ produces displacement and atrophy of the perinephric fat and consequent prolapse.

Absence of blood in the urine on microscopical examination at this period is of course no contra-indication of the presence of a stone in the ureter.

The value of an X-ray examination is realised by all. In my opinion a good radiogram should always show the shadow of a stone. The commonest source of error are phleboliths. There are of course other possible fallacies. In two cases, what appeared to have been ossific deposits in the quadratus lumborum muscle were taken at first sight to be calculi in the abdominal ureter.

Cystoscopic examination of the ureteral orifices most frequently gives no positive evidence, even when the stone is situated as closely as 1·5 cms. from the opening. The stone may in certain cases, however, be seen projecting from the opening, or the orifice may show the damage, the result of its passage. When first seen this damage may appear very great, the lips of the opening being torn and ragged, swollen and

œdematous, with a bullous cystitis in the neighbourhood. This is, however, rapidly recovered from.

The passage of an X-ray catheter is by far and away the most accurate and certain means of diagnosing the presence of a stone, locating its position, and estimating the harm that its presence is producing. Incidentally, it is also an excellent form of treatment.

The routine method of examination we employed was to examine a centrifuged deposit of urine in all cases of hæmaturia. The patient having been prepared, a complete X-ray examination of both kidneys, ureters, and bladder was then done. If a suspicion of calculus existed, a cystoscopic examination was then carried out under a local anæsthetic and an X-ray catheter passed up both ureters. If obstruction was met with, the catheters were left in position and an X-ray photograph taken, after which the urine from both kidneys was collected for twenty minutes and examined.

In a few selected cases pyelography was practised by filling the renal pelvis and ureter with 15 per cent. collargol, and then taking a photograph. By this means not only the nature and site of obstruction could be determined, but its degree could also be estimated and the amount of damage to the kidney it was producing revealed.

If the presence of a stone was diagnosed and the damage not great, as was virtually always the case, time was allowed to elapse to see whether a natural expulsion would result. A subsequent X-ray photograph was taken and compared with the former to determine whether the stone had been moved from its former site.

In certain cases chromocystoscopy was employed to determine the amount of obstruction at this stage.

Out of over fifty cases that were examined, I have the records of only six that were operated on, and two of these were extracted out of the ureter by intravesical forceps. Of the remaining four, two were impacted in the ureteral orifice and removed by suprapubic cystotomy, and only two were removed by suprapubic opening of the ureter.

The justification for operation is based on our knowledge of the surgical pathology of the disease. The stone is usually voided naturally. It may become impacted and cause obstruction; consequently renal infection is a possibility, but the most

usual and most insidious damage is hydronephrosis and renal atrophy, or a movable kidney. It may remain *in situ* and increase to great size. It may be voided into the bladder and remain there, forming the nucleus of a vesical calculus.

The problem, therefore, is when to trust to a natural expulsion occurring at a reasonably early date without serious impairment of the functional activity of the kidney above, and this can be best determined by the method already described, which is at the same time the most useful form of treatment to hasten the passing of the stone.

This examination having been carried out, the patient is encouraged to lead an active life, to drink fluids in excess, Contrexeville or Salutaris water, if he so desire, and be prepared for a subsequent attack, the nature and possible benefits of which he has had explained to him.

The suprapubic removal of a calculus from the pelvic ureter is a major operation attended with a mortality of 2 per cent. The number of cases requiring this will in the near future be further reduced by intravesical operative treatment. The lines on which this is at present being conducted are as follows:—

1. Injection of glycerine into the ureter. I have done it on several occasions. It is easy of practice, but difficult to prove the utility of.

2. Slitting the ureteral orifice with the intravesical knife. This sounds difficult, but is really easy to do, and is of benefit in the case of impacted stone at the opening.

3. Dilatation of the ureter by graduated bougie.

4. Dilatation of the ureter by the active electrode of a high frequency or diathermy current. This last method was introduced by Buerger of New York and appears to warrant further trial.

The recognition of a case of renal or ureteral calculus when the patient is enduring a severe attack of renal colic is not difficult. When, however, the attack having passed off, he is observed for the first time by the surgeon, the diagnosis of his ailment and the decision as regards the best course of treatment to follow is a much more difficult matter, as he is frequently then apparently in perfect health. In the latter case, when the history of the attacks of renal colic he had endured is being investigated, the most important clinical indications of a calculus impacted in the ureter are as follows:—

More important than the classical radiation of the pain is the fact that it is so constantly confined entirely to one side of the body. The presence of blood in the urine is usually then observed and described as having occurred. In almost every case information with regard to the presence of an increased frequency in the desire to micturate will be volunteered as having been associated with the attacks he suffered from.

When examined some time after the acute attack has subsided, the only physical sign observed frequently by me in these cases at the clinical examination has been the palpable kidney on the affected side. The organ is felt to be prolapsed, but is neither tender nor enlarged. The presence of a few red blood cells in the urine, detected when the urine is centrifuged and the deposit examined, is strong presumptive evidence that a calculus is present. The absence of these cells, however, in no way contra-indicates its presence, as frequently cases are met with where a calculus of appreciable size is impacted in the ureter and no ulceration has resulted.

The history and the facts previously mentioned having warranted further examination, an X-ray photograph of the entire urinary tract is taken. The presence of phleboliths in the pelvis leads to confusion, as they are liable to be mistaken for calculi. In differentiating between the two, it is of importance to remember that the majority of phleboliths are observed situated to the outer side of the normal position of the ureter, the commonest situation in which they occur being in the neighbourhood of the ischial spines. They may, however, be situated directly in the normal line of the ureter; but even then their nature can usually be suspected if not recognised by the fact that they are of circular or oval contour with a smooth and sharply defined margin.

The exact differential diagnosis is, however, not possible without a further cystoscopic examination. For this purpose a local anæsthetic is much to be preferred. It is also essential that facilities exist for the examination being conducted in immediate proximity to the X-ray apparatus. The cystoscopic examination may show the stone protruding from the ureter, which may be damaged from its presence close to the orifice. In the great majority of cases, however, even when the

stone is as close as 2 cms. to the opening, no alteration is seen in the ureter on that side.

When a catheter is passed, it will be arrested when it comes in contact with the stone in virtually all cases, and a subsequent photograph reveals the cause of the obstruction. It is to be advised that after the photograph has been taken, the catheters be left in position for twenty minutes or half an hour, and the secretion from the two kidneys be collected. Usually the secretion on the side obstructed is slightly less than on the other side. When, however, the flow from both sides is abundant and the disproportion not undue, the obstruction may be considered as in no way seriously impairing the functional power of the kidney above.

In such cases the course of treatment advised is to wait and see whether a natural expulsion of the stone will take place. The passage of the catheter often expedites this. After a few weeks it is advisable to take another X-ray photograph on the exact same plane as the previous one and observe whether the stone has passed further down the ureter.

When the delay is prolonged or the attacks of colic of repeated incidence, intravesical dilatation of the ureter is to be strongly recommended, employing any of the various methods already described. If these fail, or if the obstruction be more severe, and especially if infection of the renal pelvis above be revealed, operative treatment where the ureter is opened from above is then to be recommended. In such cases the extra-peritoneal route is usually employed. In several cases however, I have employed the trans-peritoneal route without regretting it.

Discussion.

Sir David Wallace said there had been few cases under his care in this country and the symptoms had not been so well marked. They often simulated appendicular colic. Pain was not so severe and differed from the pain of renal calculi. The absence of blood in the urine also differentiated it from renal calculi. The expectant treatment was apt to be disappointing on account of the back pressure effects. He endorsed the remarks as to the great assistance obtained from the use of X-Ray catheters.

Mr Scot Skirving thought Mr Wade's paper enabled one to see how many cases of small ureteral calculus really occurred. He himself had only seen a small number of cases of calculus, but he had found that the cases in this country did not have the same drastic symptoms which Mr Wade referred to, as Mr Wallace too had found. Had Mr Wade found any abdominal rigidity at all in his cases? And was there any great tenderness?

Professor Russell was of the opinion that many cases diagnosed as renal calculus were not really cases of such. In many cases the attacks were not preceded by malaise. He doubted if one ever got a calculus in the kidney where one could not make out deep tenderness high up. He referred to the symptom of hæmaturia, which had not often been a feature in his cases. He described three cases of calculus in the ureter which he had seen, each preceded definitely by lumbar pain. *In one* the pain began high up and worked down; there was a temperature, and the case was a very severe one. He might have concluded it was an appendix, but any attack of pain put the temperature up, and there was a previous history of having passed small calculi. It was, therefore, not a case of acute appendicitis. Belladonna and morphia brought relief and the patient recovered. *The second* case was diagnosed as abdominal obstruction. The patient had been given applications to the abdomen and had complained of lumbar pain, which, however, had disappeared when he saw the case. There was a tender spot on the left side. At first he might have diagnosed the case as one of appendicitis, but later after careful examination he concluded it was definitely one of ureteral calculus. *The third* case had pain on the right side. Operation had been performed, but no stone had been found. Patient complained of pain on movement, which prevented him working. The case was diagnosed as disease of the appendix. Operation was again performed and appendix removed. The case was examined further and a calculus was found in the ureter. In his experience cases of ureteral calculus were always preceded by a definite history of renal colic. Belladonna relieved the pain.

Mr Wade agreed that a history of typical attacks of renal colic was often obtained. He said that at first these cases were thought to be cases of oxaluria, but that more exact examinations had revealed their true nature.

Meeting VI.—May 5, 1920

Emeritus-Professor F. M. Caird, *President, in the Chair*

I. Election of Members

Tina M. Blaikie, M.B., Ch.B.Ed., 28 Chalmers Street; Mary Forbes Liston, M.B., Ch.B.Glasg., 33 Comely Bank; John Higgin Robertson, M.D.Ed., 25 Inverleith Gardens; J. H. N. Felix Savy, M.B., Ch.B.Glasg., Grampian Sanatorium, Kingussie; Helen Torrance Thomson, M.B.Lond., 3 Hillside Crescent.

II. Original Communications

1. MODERN OUTLOOK ON THE TREATMENT OF TUBERCULOSIS

By Professor Sir ROBERT PHILIP, M.D., LL.D.,
University of Edinburgh.

Old-World Pessimism.

In the writings of Hippocrates "phthisis" heads the list of diseases which are "inevitably fatal." The syndrome of the classic portraiture is familiar to us all—the delicate pink and white colouring, quickly changing hectic flush, cough, hasty shallow respiration, rapid pulse, pyrexia, night sweats, worn frame, wasted muscles, and prostration. But that syndrome represents merely the *terminal effects* of infection by the tubercle bacillus. The earlier manifestations—the shading of health into disease, referable to the progress of infection—escaped recognition by the older school.

Some of us can painfully recall the pathetic picture of the consumptive in the old days, with phthisis written in every trait,

waiting his turn at an out-patient department—the prolonged detention in a close waiting-room, hasty stethoscopic examination, the demonstration of physical signs to a group of students, the comfortless diagnosis, the shrug of the shoulder, followed by a return to the unhealthy environment, his sole consolation a prescription for some favoured cough-mixture or a bottle of cod-liver oil.

Present-Day Hopefulness.

The modern physician, in proportion to his experience of the disease, regards tuberculosis as most tractable if taken sufficiently early. The medical outlook on tuberculosis has undergone a radical change *within* a generation. The discovery of the essential cause has led to a recasting of our conception of the disease. This, in turn, has led to fresh lines of observation.

Evidence from many directions goes to show that Nature cures tuberculosis every day. The testimony of the post-mortem room is conclusive. The records of Nägeli (1900) established that definite indications of tuberculosis were found in 97 per cent. of bodies examined consecutively by him at Zürich, that is, of persons dying in a general hospital from all sorts of diseases and accidents. These careful observations, regarded by some critics as exaggerated, have been substantiated and reinforced by other workers.

Recently (October 1917) they were strikingly confirmed by Reinhart (Berne), who, in a long series of consecutive post-mortem examinations, found that 96 per cent. yielded evidence of tuberculosis. Reinhart went further and carefully analysed the 96 per cent., dividing them into cases which showed present activity of lesion and cases which showed more or less completely healed lesion. The remarkable fact emerged that of the 96 per cent. with evidence of tuberculosis, 32 per cent. presented evidence of progressive lesions. In other words, approximately one-third of all the patients who terminated their days from a variety of causes within a large general hospital were the subjects of advancing tuberculosis, while the remaining 64 per cent. presented evidence of healed tuberculosis.

This is an aspect of the subject which invites the careful attention of those in charge of large pathological departments. Teams of competent workers in representative centres in

different countries might quickly table comparative results of first importance.

For our present purpose the significant fact is, that many persons make a good recovery from tuberculosis. More persons recover than ultimately die from the disease.

Traditional Bias.

Yet many a doctor still shakes his head regarding the curability of tuberculosis, or, alternatively, regarding the accuracy of the diagnosis if the condition is said to be curable or to have been cured. The man in the street is similarly at sea, unduly pessimistic if he accepts the doctor's diagnosis, or hopelessly negligent if he chooses to discount the diagnosis.

A large part of ordinary practice remains based on the old Hippocratic conception. Men are still apt to think of tuberculosis in terms of "phthisis." There seems a frequent failure to think out the various stages of tuberculous infection as they do in other infections, or to realise the *full significance of early diagnosis*, and the value of sufficient interposition at a stage when the foothold of the bacillus on the system is relatively slight and easily influenced.

There is often an unreadiness to admit the presence and potentiality of the invading organism, until the results of the invasion are too clamant to be overlooked. The striking portraiture of phthisis by Hippocrates and later masters in clinical medicine has so commanded attention as in some ways to *constitute a bar to the recognition of the subtler traits* of the disease which pathological observation and experiment have revealed. Thinking along the older lines, the practitioner finds it difficult to accept, as indications of tuberculosis, the earlier expressions of bacillary action.

Hence has developed the fallacious habit of labelling many of the finer features of early disease as "pre-tuberculous" or "predisposing," if recognised at all. The diagnosis of tuberculosis is too frequently not accepted until a point is reached when the diagnosis is of little therapeutic interest or value. Even then attention is apt to be restricted to evident phenomena in *one* organ rather than to the advance and distribution of an infection which is steadily poisoning the system. When thera-

peutic measures or Nature herself has stayed the process at one or other obvious point there is a tendency to drop interest and consider the matter closed.

Reconstruction : Fresh Outlook.

There is badly needed at the present time a general reconstruction of current views, or, at least, a change of standpoint whereby the outlook may become wider and juster. The faulty perspective needs correction.

Starting from certain demonstrable facts—best of all studied in the inoculated animal—we must endeavour to follow the natural history of tuberculosis in the widest sense. With this in mind we can appraise correctly the extremely varying manifestations from the point of view of prognosis and treatment.

Of essential facts may be noted first the tubercle bacillus—the one common factor ultimately responsible for all the changing expressions of the disease. Next there is the characteristic reaction of the tissues to invasion by the bacillus —particularly the resultant tubercle, of varying appearance according as it is recent or old, according as it is single or agglomerated, according as it is spreading or limited by fibrous barrier.

The seat of immediate localisation in a given case is after all merely an *incident* in the spread of the infection, and must be so regarded in practice. For that reason I have for many years been in the habit of asking students to visualise tuberculosis very much as they visualise syphilis. Admitting that the analogy is not complete, and recognising the gaps in our knowledge, a helpful parallel may be drawn.

Analogy between Tuberculosis and Syphilis.

In tuberculosis, as in syphilitic infection, invasion proceeds along more or less definite lines. Once invasion has been successful, there is an infinite possibility of clinical expression throughout months—years—it may be a life-time—unless the invader be choked off.

In both diseases, the period of initial incubation is prolonged and ill-defined. In syphilis, given certain registrable facts, the period of incubation is relatively easy of calculation. The dates

of exposure to possible infection are generally traceable, and the first appearance of successful invasion may be definitely determined locally. In tuberculosis, on the other hand, the possibilities of infection are numerous, often obscure, recurrent, and conditioned by environment. The fact of successful invasion is rarely registered in a local sore analogous to the primary sore in syphilis.

Yet cases are on record—and one might add to the record—where the opportunity for direct infection of tuberculosis was afforded at a given date by accident, such as a cut from a broken infected sputum jar, or in carrying out an autopsy on a tuberculous cow, and where a local sore or warty tumour appeared within four weeks' time.

Primary Lesion.

Whatever we accept as approximately the duration of incubation of tuberculosis in man, it has been definitely determined experimentally in various animals, *e.g.*, in the guinea-pig, where following the subcutaneous introduction of T.B., say, in the groin, a local induration—or chancre—appears commonly about the fifth day.

Practically, the study of the primary sore in tuberculosis is more difficult than in syphilis because it seldom occurs on a skin surface. Through a mucous surface the T.B. passes more readily and causes less reactive disturbance. The mucous surfaces being largely hid from view, attention has hitherto been little directed to the point.

Much time and effort have been expended on an attempt to show by what channel the T.B. primarily enters the system. An unnecessarily sharp line has been drawn between inoculation by way of inhalation and inoculation by way of ingestion. The outcome of collective observation seems to be that inoculation of the human subject occurs by varying channels in different cases. While this is so, the great vulnerability of the tonsillar region, including the posterior nares and the fauces, is worthy of special note. The most significant tonsil in the introduction of tuberculosis is not necessarily that which presents most obvious change. In childhood such mucous surfaces are especially absorbent and succulent, and hence doubtless the greater frequency of infection in childhood.

Lymphatic Involvement.

Following the primary entrance—wherever that may have been—there succeeds a further period of latency (second incubation). After an interval of time, the duration of which cannot be exactly stated in the human subject, but may be measured accurately in the experimental animal, lymphatic glands become involved, first the glands on the same side and in the vicinity of the point of entrance, then glands at a greater distance on the same side, and thereafter the glands more widely.

This significant glandular involvement is often overlooked no less than the point of entrance. Attention has not been directed sufficiently to its importance.

Yet, from the biological and diagnostic point of view, such multiple glandular involvement ranks as of similar importance to the corresponding enlargement of lymphatic glands in the initial advance of syphilis. In tuberculosis, attention has been naturally riveted on the grossly enlarged and deforming gland which has called for surgical interference on a variety of grounds. But the *spreading* involvement of glands is *not* always strikingly obvious. Gross deformity with associated caseation and softening may be entirely absent. The result is that the progressive infiltration of lymphatic glands is missed, *unless* deliberately looked for.

It cannot be too much emphasised that evident caseation and softening, or the gross enlargement which leads to deformity of outline, is an *accident* in the tuberculous process. The accident which frequently calls for immediate local treatment by no means necessarily occurs in the course of tuberculous infection. Attention has hitherto been largely restricted to this more conspicuous but less essential part of the process, and the very success of local measures has unduly limited the outlook on the disease.

The absence of evident gross reactionary disturbance of glands does not mean a less virulent infection or less tendency to spread. On the contrary, clinical observation shows that infection spreads rapidly where the glandular implication remains uniformly slight.

Childhood is the period during which tuberculosis is for the

most part acquired. What has been called the infantile type of tuberculosis, where glandular lesions are especially in evidence with gross enlargement and associated changes, is common at that period. But commoner still is the gradual passage of the tuberculous infection by way of the lymphatic system without very striking superficial evidence. If the detection of tuberculosis—especially in children—is to become really effective, the child's glandular system must be most carefully investigated.

Focal Lesions.

While the disease may seem to be arrested or may run a fatal course at the lymphatic stage—as was illustrated strikingly among the Senegalese troops in France—the infection commonly passes therefrom more widely throughout the system, spreading by continuity of structure or by way of the circulation. Reaching the blood channel either by way of the thoracic duct or suddenly, *e.g.*, by direct passage from a gland into a vein, the bacillus may induce a *focal* lesion almost anywhere, either in bony skeleton or in viscera.

It would take us too far afield for the moment to consider the *wherefore* of local distribution in one structure or organ rather than another. It is meanwhile sufficient to note that carriage may be almost anywhere—in one case a widespread dissemination, in another, localised deposits less or more abundant.

In dealing with tuberculosis at this stage, clinicians are apt to restrict attention too much to the localised manifestation, whether in lung, abdomen, kidney, or joint. Here again the analogy of syphilis proves helpful. We have to deal with a constitutional infection. The local manifestation is incidental and may be ephemeral. A chief value of the focal lesion is that through its presence we may for the first time recognise with certainty the existence of the infection, either through characteristic local signs or through the discharge of bacilli from the affected area.

Systemic Intoxication.

The local effects, important as they are, do not constitute the chief or ultimate danger of tuberculosis. The significant factor is the systemic intoxication which sooner or later results

from the bacillary invasion. To this intoxication are traceable the more important clinical effects and the fatal termination.

The tuberculous toxines seem to act especially on neuro-muscular structures. Their dystrophic influence is evidenced by loss of sarcous substance and associated irritability of muscle. To these are referable the early manifestations of motor weakness both of limbs and of viscera—the feeling of tiredness, disinclination for effort, softening pulse, and gastro-intestinal sluggishness. These neuro-muscular effects are generally in evidence—even in pulmonary tuberculosis—long before cough or expectoration or other indication of local lesion is forthcoming.

Successful arrest of an existing local process is not everything. The very success of our local measures may be misleading. Scientific caution should forbid a hasty conclusion that the infection has been thereby stayed. Experience of syphilis—prior to the days of salvarsan and Wassermann tests—led to insistence on prolonged surveillance and repeated mercurial and iodide treatment. Even when every possibility seemed to have been met, the syphilitic infection sometimes reasserted itself.

In tuberculosis, we are still much in the position we were with regard to syphilis in these earlier times. We are not yet armed with the effective aid of an equivalent to salvarsan in treatment, and we are without a blood test of convincing value. We have still to grope our way in relatively uncertain light. The one sure fact is that recurrent manifestations cannot certainly be excluded.

Effective Diagnosis.

What is to be our criterion as to the existence of tuberculosis? The T.B. is far from being always in evidence. Reasons for this readily suggest themselves. For the diagnosis of tuberculosis, we cannot therefore insist on the production of tubercle bacilli as some would demand. Before the days of the *spirochæte pallida* we diagnosed syphilis on clinical evidence with remarkable exactitude. Such evidence is *abundantly* available in tuberculosis.

In addition, tuberculin tests (cutaneous, mucous, intracu-

taneous, or subcutaneous) are serviceable. They have not been given—as it seems to me—the place to which they are entitled. The subcutaneous test especially—in experienced hands—gives positive or negative evidence of highly important character. A positive reaction indicates at least that the individual has been tuberculised, and may prove much more in a variety of directions. The test which leads to the slaughter or, at least, the exclusion of valuable cattle from accredited herds must not be set aside as untrustworthy or dangerous in the human community.

Although, up to the present time, serological methods have yielded less convincing results in tuberculosis than in syphilis, the outcome of observations from various sides suggests that tests of a sufficient and practical kind may yet be developed—perhaps by way of complement deviation, or by way of agglutination.

While freely admitting the obscurity which still enwraps certain aspects of the problem, we are none the less coming towards the light. With definite knowledge of the essential organism, its life-history, its methods of entrance into the body, characteristic early focal lesions, and the production of toxines with resultant systemic intoxication, we are well on the road towards a scientific conception of tuberculosis which affords precision to procedure in diagnosis, prognosis, treatment, and prevention.

The recognition of the tractability of tuberculosis, if taken sufficiently early and sufficiently firmly,—whether in glands, bones, joints, lungs, abdomen,—constitutes an advance of first importance.

Early diagnosis and maintenance of suitable treatment for a *sufficient* length of time mean everything. A case once recognised as one of tuberculosis must be kept under surveillance from time to time until there is reasonable ground for believing that the disease has been satisfactorily overcome. Even then, it is a good rule that the subject of tuberculosis should have himself periodically overhauled to exclude the possibility of recurrence.

In this way only are we likely to get rid of the present order of things, when, too late in the day, a large part of most men's time is spent in trying to *patch up* the incurable cases of

advanced tuberculosis, whether in the respiratory, genito-urinary, alimentary, or other tract.

Long Duration of Tuberculosis.

A point of much scientific and practical importance—far from sufficiently recognised—is the extraordinarily prolonged course frequently followed by tuberculosis. In arranging my thoughts for the meeting to-night, I have gone through a pile of records in which, as the papers show, the disease continued under observation for ten, fifteen, twenty years and more. Some of these are cases in which T.B. were discovered more than twenty years ago and have been found at successive intervals up to date. In two cases of lung disease, there is a record of extensive cavitation throughout twelve and twenty years. In some cases, apparently the natural resistance of the individual was sufficient to cope with the invasion apart from special treatment, while in others, continued surveillance, with the repeated institution of appropriate measures from time to time, has succeeded in maintaining the balance in favour of the patient.

The lesson has still to be enforced that *tuberculosis takes a long time to come* and no less certainly *takes a long time to go*. The official three months—doled out to most cases in this country under the Insurance Act—is hopelessly inadequate for the purpose of lasting arrest. For the most part, it is waste of time, money, and effort. The practice is based on a misunderstanding of the natural history of the disease and the needs of the local lesion and systemic infection.

The local lesion can only be repaired by a slow and gradual process of cicatrisation, the completion of which *requires* many months, and may require years. The systemic infection demands equal care. The duration of treatment must be determined by the needs of each case, and this calls for skill, experience, and judgment.

Even when such treatment has apparently been successful, a *caveat* should remain in the back of one's mind—and if necessary be expressed—as to the possibility of fresh outbreaks.

The Passing of Tuberculosis.

With all the difficulties inherent to the problem, and the hopelessness of many a case which the doctor is up against from

time to time, some excuse may be pled for the jeremiads to which one is frequently treated regarding the futility of all our

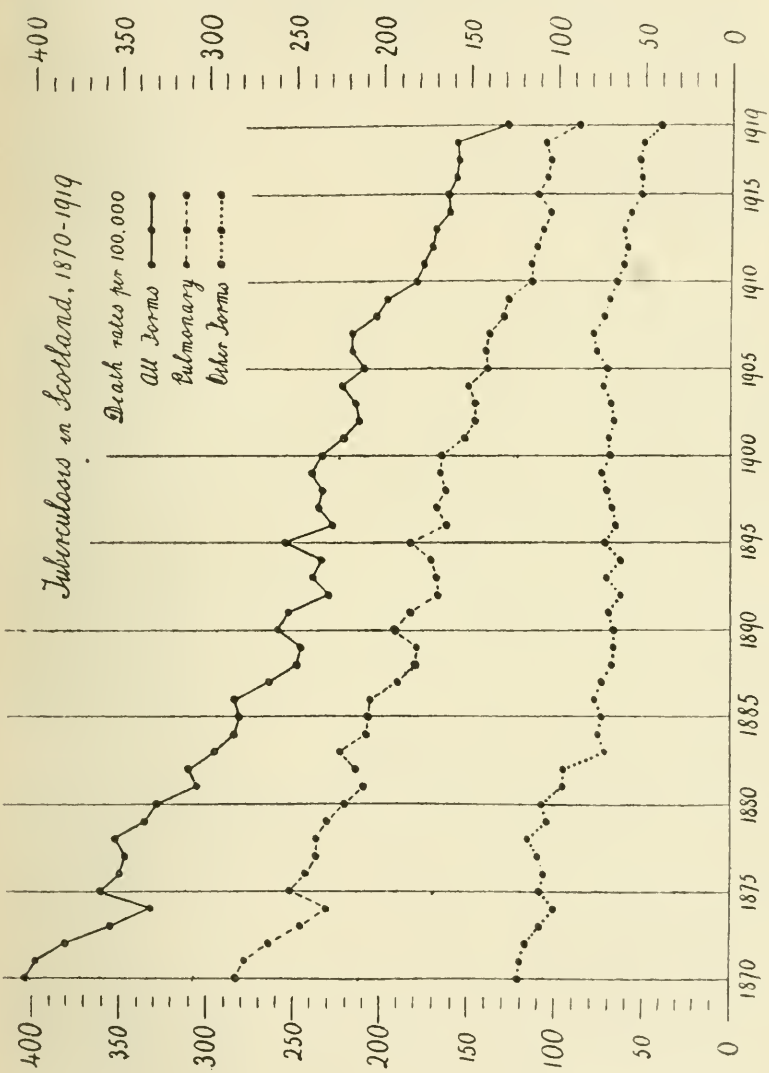

FIG. 1.—Mortality from Tuberculosis in Scotland during the last fifty years.
(*Table prepared by Statistical Department of the General Register House.*)

efforts against the disease. But are these justified by the facts? Two thoughts suggest themselves at this point.

Lessened Morbidity.

The first has reference to individual cases, and here I record my own experience. As compared with the frequency with which, twenty-five or thirty years ago, one saw for the first time cases of far advanced disease for which nothing could be done, such a case is now comparatively uncommon. While there are exceptions, the great bulk of cases one sees nowadays are at a *comparatively* early and tractable stage. This experience is increasing from year to year.

Accelerating Drop in Death-Rate.

The second thought is based on the convincing proof of the preventability and curability of tuberculosis which is given in broad and definite outline by the striking decline of mortality which has occurred in relation to tuberculosis. This is the more significant as it may be safely assumed that, with increasing exactitude of diagnosis, the actual proportion of deaths properly registered has increased.

Fig. 1 shows the death-rate in Scotland per 100,000 of the population from various forms of tuberculosis during the past fifty years. The progressive decline throughout the period is remarkable. A first hasty glance suggests that this decline has been continuous and equal from decade to decade. More careful analysis of the curves shows that this is not so. The fall has latterly been much accelerated.

Thus taking the first twenty years up to 1890, the *percentage* fall in mortality from all forms was 35, while, during the last twenty years, from 1900 to 1919, the *percentage* fall was 45. Fig. 2 illustrates the accelerating drop in death-rate during the last two decades.

Omitting the last five years as being unusual in relation to the War, and taking twenty-five years previous to that, the comparable figures of the mortality from pulmonary tuberculosis in England and Scotland are of interest. In 1890, for England, a death-rate of 168 per 100,000 as against 116 in 1915, *i.e.*, a drop of 30·9 per cent.; and, for Scotland, in 1890, a death-rate of 193 per 100,000 as against 111 in 1915, *i.e.*, a drop of 42·4 per cent.

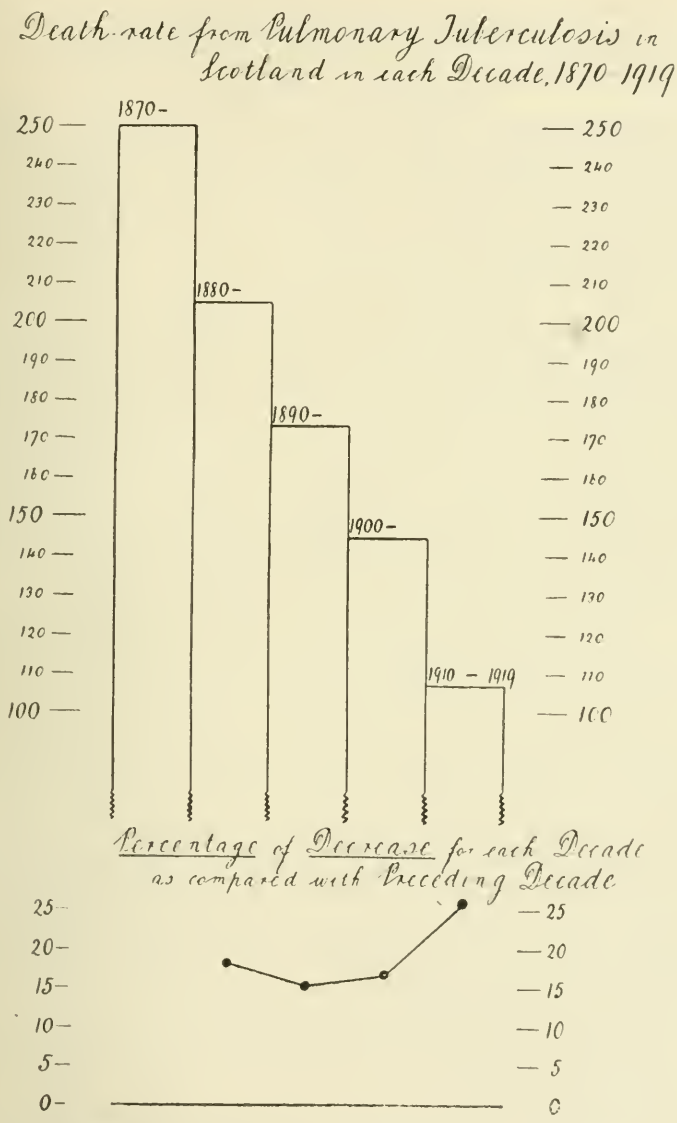

FIG. 2.—Mortality from Pulmonary Tuberculosis, showing accelerating drop in Death-rate during the last twenty years.

(*Table prepared by Statistical Department of the General Register House.*)

In addition to the fall in the death-rate, it is to be noted that the age at death is gradually being postponed.

Optimism Justified.

Viewed broadly, then, there is ample reason for a sound optimism. Tuberculosis is coming to be understood and handled scientifically. The disease has been dislodged from the opprobrious position it occupied in classic writings. Tuberculosis is successfully arrested every day.

Observation and Research.

Much remains to be done. There is need for continuous, intensive investigation—clinical and experimental. There are many problems—biological and clinical—pressing for solution. The men who have capacity and material must be given time and opportunity. Care must be taken that their energy is not frittered away on matters which have little interest or value, for example, on mere routine duty which might perfectly well be overtaken by a trained typist or laboratory assistant.

The undergraduate must be trained on modern lines, so that whether he develop private practice—medical or surgical—or take a post in the expanding Health Service, he may be in a position to cope effectively with the changing aspects of the disease. His attention must be diverted from the last stage of tuberculous disease, whether in the form of advanced pulmonary, genito-urinary, abdominal, or other tuberculosis, to its completer consideration as an infective process.

Starting from the initial infection, he must be *trained to think of the earliest clinical and pathological manifestations*, their great tractability, and the possibilities which await the patient if these are not checked. His earliest object-lesson should be the guinea-pig with its local sore at the point of inoculation, and the gradual spread through the various groups of lymphatic glands to the finished picture when the several viscera are involved.

If thought regarding the occurrence of tuberculosis in the human subject and its further developments be thus guided along scientific lines, we may confidently expect that tuberculosis, as a killing and maiming disease, will be largely outmanœuvred.

2. NON-PULMONARY TUBERCULOSIS: CONSERVATIVE METHODS OF TREATMENT

By SIR HENRY J. GAUVAIN, M.D., M.Ch., Medical Superintendent, the Lord Mayor Treloar Cripples' Hospital and College; Consultant in Surgical Tuberculosis to the Essex County Council, etc.

MR PRESIDENT, LADIES AND GENTLEMEN,—I desire to express to this Society my thanks for, and appreciation of, the great honour conferred on me in being invited to open the discussion on non-pulmonary tuberculosis, and particularly am I grateful in being permitted to be associated with Sir Robert Philip, whose brilliant and untiring labours have won recognition and admiration at least as great south of the Border as in Scotland.

It is impossible in the time at my disposal to discuss with any fulness the subject entrusted me; neither shall I attempt the task, but rather while drawing attention to some of the more important principles concerned in the treatment of so-called surgical tuberculosis, I shall hope to provoke discussion on omissions as much as on statements I may make. Many important methods of treatment especially suited for particular cases cannot even be alluded to. Omission of mention of these is not due to the fact that I do not fully recognise and appreciate their importance and advantage but to lack of time.

Before discussing those methods of treatment of non-pulmonary tuberculosis now in vogue, it is desirable to outline our present conception of the disease.

Surgical tuberculosis should no longer be considered as a merely local infection. It is a general disease of which the osseus, articular, lymphatic or other lesions are local manifestations, and these manifestations, though very important, by no means necessarily represent the predominant factor. It is peculiarly desirable to emphasise the importance of the "soil" of the patient attacked and its influence on the dissemination of or resistance to the infection. To draw an analogy from the vegetable world, the seeds of any given plant, sown in different soils, under different climatic or other conditions, will produce widely different results. Similarly, manifestations of tuberculous

disease in different patients, even when infected from the same source, may vary considerably. This is an almost self-evident fact, though so little appreciated that it may be permissible to refer to it.

Non-pulmonary tuberculosis is so protean a disease, has so many manifestations, may differ so widely in different patients in its progress or its retardation, that no one form of treatment has been devised which may be successfully adapted to all cases. Generally, the treatment applied is described as either radical or conservative. Radical treatment is based on the conception that tuberculous disease is a condition susceptible to amelioration or cure by the removal of the affected part, or such lesion or lesions as are clinically demonstrable. Such a neo-plasmic theory has its logical outcome in radical surgical treatment, consisting in the total removal of the tuberculous tissues, a practice which, while possible and efficacious with small tuberculous foci, exposes the patient to serious risks when applied to extensive bony lesions. Moreover, while in these cases it is often not possible to effect complete removal of the infected tissues, this method, by the extensive mutilations which it involves, gives rise too often to deplorable orthopædic results. Again, the large area of absorption which extensive operations creates, exposes the patients to grave dangers of fresh inoculation of tuberculous and other organisms, and often leads to the production of secondary visceral or bony lesions.

By conservative treatment of surgical tuberculosis, I mean the adoption of all those measures which tend to improve the patient's general health, increase his powers of resistance and preserve and restore the part attacked, in contra-distinction to radical treatment, which, as I have said, aims at the cure of the disease by the removal of the local lesions. It does not necessarily exclude surgical interference, but such interference is avoided as much as possible, and with increasing skill in the application of conservative methods is but rarely indicated. The fibrous barriers which nature herself has created around each individual lesion are not lightly incised to allow a further spread of the disease.

Conservative treatment must not be confounded with convalescent treatment. Convalescence is a period in the recovery from the disease which calls for appropriate measures,

which measures, however, cannot supplant those indicated at an earlier period. There is a period of convalescence after conservative treatment, just as much as there is such a period after the application of radical measures.

Regarding, then, non-pulmonary tuberculosis as a general disease of which the local lesions are but special manifestations, the logical conclusion to be arrived at is that such a general disease demands general treatment. To reinforce and strengthen the natural defences against the attack of tubercules bacillus is the surest way to defeat that attack. This is immediately evident in early or so-called pre-tubercular cases, where good general conditions alone will often convert a delicate and ailing child into a strong and vigorous one. It is equally if not more important when the disease has obtained a firm hold and local manifestations have appeared. Life in the open air, far from towns and in a dust- and germ-free atmosphere, under the bactericidal and tonic action of the sun is a first principle in anti-bacillary therapeutics, and, as Casteigne has said, the patient himself may thus make the whole fight against the bacillus.

Conservative treatment,[1] then, implies the adoption of all methods of treatment, other than radical, calculated to eradicate the disease. Such treatment may be described under the heads of—

(1) General measures of treatment.
(2) Local measures of treatment.
(3) Adjuvant measures of treatment.
(4) Treatment of complications.

The requirements of general treatment may be considered under the following heads—

Climatic.	Hygienic.
Occupational.	Dietetic.
Specific, etc.	

Climatic Treatment.—Mountain, country, or marine air is indicated. Mountain sanatoria for the treatment of surgical tuberculosis are almost out of question in this country, because the mountain climate which would be ideal is unobtainable in Great Britain. Our mountains are too much enshrouded in fog

and cloud, the rainfall is excessive, the amount of sunshine too limited, the extremes of temperature too severe. Suitable treatment in this country is best obtained at the seaside or in the country. Speaking generally, I believe that country treatment is better for the early cases and marine treatment for the more advanced or chronic cases, including those with old sinuses, but to this there would be exceptions.

Treatment should be undertaken in a district reasonably remote from towns, preferably where tuberculous disease is known to be little prevalent. If in the country, it should be at a fair elevation, and, for choice, on the slope of a hill facing south, so as to secure the maximum of sunlight. A sheltered situation is not a necessity. Wind is no disadvantage. On the contrary, in the case of non-pulmonary patients it may exercise a stimulating effect. The district should be sunny, the rainfall not excessive, the soil porous and of a character that quickly dries after rain, for choice, of chalk. The situation should be remote as possible from the neighbourhood of a river or a swampy district where the air is excessively humid, and where fogs or mists prevail. If the situation is at the seaside, it is of the first importance that treatment should be undertaken away from a town. A seaside pleasure resort is contra-indicated, because here the patients may be robbed of what is at the seaside a prime necessity, the untrammelled use of the beach.

The best results are, in my opinion, obtained by the establishment of two institutions under the same management, one in the country and the other at the seaside, so that a continuity of treatment may be ensured. It should be possible to transfer patients from the one hospital to the other, so that the benefit of a change of air and scene may be obtained. The case which is at a standstill or going slowly backwards can then often receive the added stimulus which may lead to improvement or cure. Two such institutions are now established in connection with our work at Alton. The hospital at Alton is situated on a site which is in every way ideal for inland treatment, and we have now secured an equally suitable site for marine treatment at Hayling Island, where on an estate of some 60 acres we have the untrammelled use of a mile of beach on which the estate abuts, and which is so situated that our activities cannot now or at any time be interfered with.

Hygienic Treatment.—The value of fresh air in the treatment of tuberculous disease is so well recognised that I need not labour it here. For patients treated in institutions, the hospital should be so designed that the sufferer practically lives in the open air but yet remains sheltered from rain and can receive that bodily attention which can only be obtained by the best nursing. The skin of patients immobilised in the ways indicated for the treatment of surgical tuberculosis requires the most careful attention to prevent the formation of sores. Indeed, in few classes of patients is the necessity of that particular personal attention which may be summed up under the head of personal hygiene more urgent than in the case of the tuberculous.

Occupational.—Patients accepted for treatment for long periods in large institutions, or indeed when treated privately, need kind but firm and tactful handling and occupation suited to their limitations, unless they are to lose that mental distraction which is a powerful aid to cure. Left without occupation they tend to be discontented and may become degenerate. Lack of kindly discipline and well-ordered occupation has not infrequently brought sanatorium treatment into discredit which has been more than counterbalanced by the benefits derived from properly-designed occupation, as so ably advocated by Sir Robert Philip and many of his followers. In surgical tuberculosis the need is at least as great, perhaps even greater, than in pulmonary tuberculosis. Children should be educated, adolescents trained, and adults occupied, according to their capacity. Such wholesome discipline is of the greatest benefit, as a visit to Alton would quickly prove. Happier patients in any hospital could hardly be found. Patients are almost as busy as the staff.

In connection with our work there are no fewer than five educational establishments.

First, there is the Nursery School, where children from the ages of two to five years are instructed and entertained as far as their capacity allows. It may seem at first almost absurd to think of small children under five suffering from acute tuberculosis of the spine, recumbent, immobilised and hyperextended, receiving educational advantages. Nevertheless, the Nursery School for such patients has proved of the very greatest

benefit, and the tedium of long enforced recumbency has been greatly alleviated by bright instruction given in an assimilable form to these young patients.

Next we have a Hospital School, where patients between the ages of five and sixteen receive regular carefully-planned instruction. Considerable organisation is needed to allow such instruction to be given and yet not interfere with the medical and nursing care which child patients require. To ensure this, it has been found necessary to double our night staff so that the wards may be relieved for teachers' duties during such times as they are called upon to instruct the patients. The morning session is devoted to ordinary school lessons; the afternoons to various forms of handwork, such as cane work, Indian basket work, pottery designing, leather work, and needlework in all its branches, and singing. Such occupation is a source of intense delight to the patients and is of great assistance in their treatment.

At Hayling we have another school, where the lessons are arranged as differently as possible from the lessons at Alton. Here the work is undertaken at the seaside, and instruction is given in physical geography, the meaning of the tides, the currents, and the hundred-and-one objects of interest to be found on the seashore.

For older crippled boys receiving training according to their limitations, we have a special intensive system of education designed to fit them for their future calling.

Lastly, for these same boys, there are continuation classes for more advanced and specialised work.

All forms of instruction are in accordance with the syllabus of the Board of Education and subject to the approval of the Board Inspectors.

I have dwelt a little on this side of the treatment of patients suffering from non-pulmonary tuberculosis because such methods are now beginning to be recognised as of the utmost importance in the management of patients whose treatment is of necessarily long duration. The physician must adopt a wider outlook, his duties are not limited to mere medical treatment of the disease. Of what avail is it to treat a patient for many years and leave him at the end of that time, perhaps cured, but still a comparatively useless member of the community and incapable of entering into that active life which is his due.

Dietetic.—Beyond stating that a liberal, plain, and varied diet suited to the sometimes capricious appetite of the tuberculous should be prescribed, I would offer few remarks. Special diet is of course indicated in particular cases; milk and meat are of prime importance. Of special diets perhaps the most interesting yet devised is that which has been suggested by Ferrier, who, recognising that tuberculous lesions when healing first fibrose and later often calcify, has drawn up an elaborate and rather severe dietary calculated to assist this natural process of cure. In the form advocated by Ferrier this dietary is too severe to be wisely adopted, but in a modified form, when the lesions are healing, it may be used with advantage to the patient.

Specific.—Attempts have been made recently to discover chemotherapeutic measures[2] of treatment in tuberculous disease. These efforts, however, have not been attended with conspicuous success, though a start has been made which is not without hope for the future. At present, however, specific drug therapy does not occupy a sufficiently important part to be included in regular, recognised means of treatment. It holds, however, promise for the future, and developments will be awaited with great and increasing interest.

Local Treatment.—This matter is of extreme importance both for the cure of the local lesion, the prevention or correction of deformity, and the management of complications such as abscesses and sinuses. It is essentially a matter for a specialist, and perhaps no other disease requires more a specialist's care than does tuberculous disease of the bones and joints, if the best results are to be obtained. That it does not receive this attention is shown by the fact that tuberculous disease causes more crippling than any other condition in this country. The best results are undoubtedly obtained by the employment of conservative methods applied with minute attention to detail. Each case requires its special treatment. Only in this way can results approaching perfection be obtained.

Speaking generally, for the more severe local lesions it may be said that there are three stages of treatment depending upon the progress of the disease, viz.:—

(1) Acute commencing and progressing disease, which requires absolute rest in the recumbent position, with immobility

of the part attacked, combined with the adoption of special means to correct or prevent deformity and abolish muscular spasm. The length of treatment will vary with the nature of the case, the resisting and reparative powers of the patient (which general measures will improve), the virulence of the infection, the "soil" of the patient, the site and extent of the lesion, the presence or absence of other lesions, the age of the patient, etc. Only prolonged experience and considerable judgment can tell when this stage may be abandoned. It is incorrect to assert that every case requires a similar, even approximately similar, period for treatment. The time required will vary within very wide limits.

(2) The chronic or subacute stage. Here recumbency is, as a rule, neither necessary nor desirable, but very complete immobilisation of the part attacked is essential for a double purpose (*a*) to allow repair to take place; (*b*) to prevent the occurrence or increase of deformity.

(3) The stage of convalescence. Now complete immobility is not essential, but protection or support, which may be given by light, accurately fitted, removable splints, is usually sufficient. These may usually be discarded while the patient is at rest, but should be worn at other times.

These periods of treatment are mentioned as general guides. They apply especially to the two commonest forms of bone and joint tuberculosis—spinal caries and hip disease. The length of time required in each stage of treatment will vary within wide limits, and the decision as to when one may be abandoned and the next undertaken requires much experience. The problem with regard to adults differs to some extent from that of children. In adults, radical measures, especially in certain forms of tuberculous arthritis, may be more often indicated; but, generally speaking, the great majority of cases will do better if conservative measures are alone employed.

To illustrate local treatment for two of the most important forms of non-pulmonary tuberculosis—spinal caries [3, 4, 5] and hip disease. In spinal caries it is my custom to treat children recumbently for as long as the disease is active; moreover, these patients are not only recumbent but immobilised and hyperextended to ensure the most complete rest to the lesion and to prevent or correct deformity. When the disease is

no longer progressive, and consolidation of the lesion has commenced, strict recumbency is no longer essential, but immobilisation is still of paramount importance, and at this stage nothing is of greater value than the application of properly fitting plaster jackets made with careful attention to technique. Later, for such complete immobilisation may be substituted removable apparatus, of which perhaps the most useful and generally serviceable is a well-fitting celluloid jacket.

In hip disease, the principle of local treatment remains the same, but here extension is, I think, of very great importance. Not sufficient credit has been given to the pioneers of this method of treatment, notably the late Professor Howard Marsh. The decision as to how long extension should be maintained once it is applied, is a question which has given rise to considerable discussion. In my opinion the decision should be largely influenced by the end result desired. If it is considered sufficient to obtain a well ankylosed hip-joint in a good position, then extension may be abandoned as soon as deformity has been corrected and a plaster spica applied in its place until the lesion has healed; this to be substituted later on during convalescence by some removable splint such as a celluloid apparatus. If, on the other hand, it is desired to regain mobility of the affected joint, the best prospect is obtained by the continuation of extension until the disease is no longer active, as shown by absence of muscular spasm, which may be conveniently detected by a sign I have described elsewhere [6].

There is not time for me to state my reasons as to which end result should be aimed at, but I would just say that, in my opinion, the most successful result is not obtained until not only is the disease arrested but until a very fair range of movement in the affected joint has been re-established.

Time will not permit me, either, to mention methods of local treatment in other forms of non-pulmonary tuberculosis, and I would now refer to methods which I have described as

Adjuvant Methods of Cure.

Amongst these I would give first place perhaps to heliotherapy or the Sun Cure [7,8].

Heliotherapy should be regarded as an adjuvant and merely as an adjuvant method of treatment of non-pulmonary

tuberculosis. The somewhat extravagant claims made by continental advocates of this method need to be examined with critical care. Statements such as "the sun will cure all forms of surgical tuberculosis" are contrary to fact, and will tend to bring disrepute and disillusion on a method of treatment possessed of many advantages, and the application of which is all to the good, but with definite limitations.

The action of sunlight may be conveniently regarded from two standpoints:—

(1) Its local or direct action, the benefit of which is confined to superficial lesions, by its local bactericidal effects combined with favourable inflammatory response which carefully graded exposure elicits.

(2) Its remote or indirect action, which induces favourable constitutional effects and benefits deeply-seated lesions.

It has been asserted that the value of sunlight is due to the ultraviolet rays found in the solar spectrum, but this is a matter of some doubt. The infra-reds are of much greater penetrative power and are also bactericidal.

I would emphasise the importance of care in the exposure of patients to the action of sunlight. Excessive reactions must be avoided, insolation must be gradually applied. The patient must always have his head protected, must never be too hot nor too cold, should be acclimatised before insolation is commenced, and short exposures only given, first to the extremities, proceeding gradually until the whole body except the head can receive safe exposure. Pigmentation is essential if the full indirect value of insolation is to be obtained. Some will not pigment, and for these general sun treatment is of no avail.

Time does not permit of my discussing other adjuvant methods of treatment as vaccinetherapy, chemotherapy, surgery, X-rays[9], etc., but with your permission I shall refer very briefly to the treatment of one of the commonest complications in non-pulmonary tuberculosis — the treatment of tuberculous abscesses.

A first principle in the treatment of tuberculous abscesses[10] is the avoidance of their spontaneous opening and subsequent sinus formation. The formation of a sinus is almost always followed by a secondary infection, not only of the sinus itself,

but also of the focus of the origin of the disease, and when this focus is an extensive one, as in cases of hip disease and spinal caries, the consequences may be disastrous.

A brief review of the treatment which has been adopted may perhaps explain how we have arrived at the present conception of the conservative treatment of tuberculous abscesses of bony origin.

Three chief epochs may be considered—

(1) When tuberculous bony disease was not separately classified but confounded with a diffused group of bony inflammatory conditions. During this period, in the total absence of any conception of sepsis or asepsis, treatment was almost futile. Some employed large incisions; others were opposed to any incision. David, indeed, stated, "I have always observed that patients die in whom an abscess has been opened," and he insisted upon the avoidance of any interference. At this time the opening of abscesses by caustics was in vogue, but the results were by no means satisfactory. Simple puncture, with or without aspiration, had already convinced partisans. Abernethy practised the "valvular system," which consisted in evacuating the contents of the abscess by introducing the blade of a tenotome obliquely into the abscess cavity. These methods foreshadow those now employed with success, but their value was at that time mitigated by ignorance of the principles of asepsis.

(2) The second era opened with the work of Lannelongue in France and Koenig in Germany. Tuberculous disease of the bone removed from the chaos of chronic bone diseases became clearly defined and took its proper place. Lannelongue showed that the progressive extension of the abscess towards the skin was not a mechanical phenomenon but the result of primary infection and a subsequent eccentric destruction of tissues by tuberculous elements advancing much as does a neoplasm. From this "tuberculome" conception followed logically the radical surgical treatment, which need not be here further discussed other than to state that the extensive operations which were then in vogue led to such great mutilation and subsequent mortality that they are now almost abandoned.

Next there followed a less daring and less radical surgical period, which still represents to some extent the practice of the

present day. This limited surgical practice while abandoning attempts at complete removal of the more extensive bony lesions, confines itself solely to an attack on the abscess. Essentially it consists in curetting or excising the abscess cavity and its diverticula under the most rigorous antiseptic precautions. The incision required at the operation is then sewn up and an endeavour is made to secure its primary union. From *a priori* reasons this practice is open to many objections, objections which are confirmed by experience.

Tuberculous abscesses of deep origin are, during the early part of their evolution, sub-aponeurotic and even sub- or intramuscular. The aponeuroses of the muscles constitutes an extremely strong natural barrier which, for a considerable time, impedes the advance of the abscess in its progress towards the surface. By dividing these natural barriers, their strength is of necessity impaired. Moreover, it must be remembered that the abscess cavity often refills with considerable rapidity, and the most important fact to be considered in dealing with the abscess is that this method does not remove the cause of its formation. The primary lesion which produced it still remains, the pus re-forms, the cycle in the history of the abscess recommences.

As far as the operation itself is concerned the results at the first sight appear to be excellent, but in many cases after the lapse of time, which varies from a few days to some months, or even years, pus re-forms either in the original abscess cavity or in some part of the severed tissues. The scar tends to become raised and eventually breaks down. A more or less abundant discharge follows, and later, in spite of the application of aseptic dressings, secondary infection too often ensues. We thus arrive at the last phase in the treatment of tuberculous abscesses—the conservative method, which is that which I now invariably adopt. Before describing this method in detail, it is desirable to explain the conception of tuberculous disease which makes it a rational one. The "tuberculome" theory already alluded to requires some modification, and to it is opposed a theory based on the defensive resources of the patient. A tuberculous lesion naturally evokes a reaction. There is the formation of a zone of resistance about the focus of the disease by the formation of granulation which encysts, limits, and tends to prevent the progress of the infection. Thus the issue is the result of two

opposing forces, the disease which attacks the organism and the reaction which this attack provokes. It appears reasonable to reinforce this natural defence and diminish the virulence of the attack of the bacillus, limiting in this way its progress. The essentials for the logical treatment of tuberculous abscesses are secured by the adoption of general and local methods as already alluded to. The earlier such treatment can be applied the better the results obtained. During this treatment the properties of the abscess itself tend to become profoundly modified. Complete immobilisation in the horizontal position in not a few cases causes the abscess to disappear. The abscesses assume less those neoplastic tendencies to which I have previously alluded. They are slower in their appearance, they have less tendency to invade and a denser encysting capsule appears as evidence of a strong reaction. Spontaneous absorption not infrequently occurs, but if the abscess progresses then arises the indication for aspiration with or without the assistance of modifying fluids.

Into the technique of aspiration I cannot here enter, other than to say that a skilled technique is essential if success is to be obtained. Proper aspiration of a tuberculous abscess is not merely a matter of plunging a needle into the abscess cavity. Such crude measures will inevitably lead to disappointment.

I would, however, draw your attention to a very remarkable phenomenon which follows the treatment of abscesses by aspiration as compared to abscesses treated by incision.

An abscess, which has been incised and which subsequently re-forms and later becomes a sinus, heals as from the causative lesion to the periphery,—in other words, the healing is centrifugal. In the case of abscesses aspirated the reverse occurs. The pus is removed from the abscess cavity, the walls of the cavity collapse, there is a certain amount of blood released from these walls and stimulation of fresh granulation tissue at the periphery. Fibrosis occurs, the abscess wall thickens and contracts up towards the causative lesion. Eventually the former abscess cavity is represented only by a mass of scar tissue, and as the lesion heals this fibrous tissue tends to and eventually disappears. The reverse method of healing has here occurred; it is centripetal, and so fundamentally differs from the method after incision.

The true value of any method of treatment[11] can only be gauged by the end results achieved. A hip may be successfully excised for tuberculous disease of the hip-joint, but if the patient subsequently dies of sepsis, or if he recovers and is left with such crippling that he is permanently completely disabled

Analysis of patients suffering from Surgical Tuberculosis admitted to and discharged from the Lord Mayor Treloar Cripples' Hospital between September 1908 *and August* 1919:—

Lesion.	Number Admitted.	Number Discharged.	Conditions on Discharge.						Average Duration of Stay.
			Disease Arrested.	Improved.	Unimproved.	Transferred Elsewhere.*	Removed at Parents' Request before Treatment completed.	Died.	
									Days.
Tuberculous Disease of Spine	803	699	585	17	24	21	31	21	443
Tuberculous Disease of Hip	770	670	622	15	2	9	13	9	399
Tuberculous Disease of Knee	294	271	248	6	...	4	7	6	306
Multiple and other Tuberculous Lesions	288	253	213	13	3	8	7	9	322
Total	2155	1893	1688	51	29	42	58	45	367
Percentages . .	...	...	88·1	2·7	1·5	2·2	3·0	2·4	...

* Includes boys transferred direct from Hospital to the College for technical training. No death has occurred in the College.

the result can hardly be regarded as satisfactory. I append herewith figures presented to the Board of Education giving the end results of treatment at Alton to September 1919.

I venture to think that these figures themselves are the best argument in favour of the adoption of conservative measures of treatment in non-pulmonary tuberculosis.

Notes on Statistics.

(*a*) By "arrested" is meant that the disease appears to be cured, abscesses absent, sinuses healed, and the patient able to resume his ordinary life not under skilled supervision.

(*b*) Patients are classified according to their principal lesion. A very large number have multiple lesions, but these are called cases of multiple tubercle only when occurring in the smaller joints and not affecting the spine, hip, or knee. For example, a case of tuberculous disease of the hip-joint, with tuberculous disease of the knee, ankle, and dactylitis, would be entered as "tuberculous disease of the hip."

(*c*) In these statistics no mention is made of septic cases. The percentage of septic cases admitted is unfortunately a high one. The majority of those discharged "unimproved" are septic cases. It was noticed that the number of septic cases admitted increased considerably during the war.

(*d*) The causes of death were miliary tubercle, 4; sepsis and amyloid disease, 15; meningitis, 19; other conditions, 7; total, 45.

The references here appended are to contributions I have made on various methods of treatment adopted at Alton, and therein described in detail.

References:—[1] Surgical Tuberculosis—its need and treatment, *Lancet*, August 1912. [2] Chemotherapy in Cutaneous Tuberculosis, *Lancet*, 15th March 1919. [3] The Mechanical Treatment of Spinal Caries (Splints and Hyperextension), *Lancet*, 4th March 1911. [4] The Use of Plaster of Paris in the Mechanical Treatment of Tuberculous Disease of the Spine, *Practitioner*, January 1913. [5] The Use of Celluloid in the Treatment of Tuberculous Disease of the Spine, *British Medical Journal*, 7th June 1913, and *Proceedings of the Medical Society of London*, 1914. [6] A Sign of Pathological Activity in Tuberculous Disease of the Hip-joint, *Lancet*, 16th November 1918. [7] Heliotherapy in Surgical Tuberculosis, *British Journal of Tuberculosis*, April 1914. [8] The Role of Heliotherapy in Surgical Tuberculosis, *Tubercle*, June 1920. [9] Heliotherapy and X-rays in the Treatment of Surgical Tuberculosis, *Electrotherapeutical Section, Royal Society of Medicine*, April 1917. [10] The Treatment of Tuberculous Abscesses of Bony Origin by Conservative Methods, *Lancet*, 5th March 1910. [11] Report on the Medical Work of the Lord Mayor Treloar. Cripples' Hospital, Horace Marshall & Son, 1915.

Discussion.

Professor Gulland would like to have heard more about the use of vaccine therapy in the treatment of tuberculosis. He was very much in favour of the use of tuberculin in treatment, and wondered if Sir Robert and Sir Henry had also found it useful and successful. One point to which he attached great importance, and which had not been referred to, was gaining the goodwill of the patient. He illustrated the great importance of this by referring to a case where the patient's goodwill had helped enormously in the cure of the disease. One great difficulty in connection with sanatorium treatment was the time question, and also the fact that the patient invariably wished to know the why and the wherefore of each detail in treatment; if the patient can help himself, and he can by his goodwill, etc., so very much the better, and the recovery is established very much quicker.

Mr Fraser was rather sorry that the pathology of tuberculosis had not been referred to more. He agreed thoroughly with all Sir Henry had said in regard to conservative treatment, etc., but he was convinced that it was not by any means always possible to carry out this conservative treatment. Very often it was, in his opinion, essential to carry out operative measures. He here referred to several cases where, after operative measures, the patient had recovered his normal health. There were three factors of importance which had to be taken into consideration in regard to this question—

1. The social condition of the patient.
2. The age of the patient. Young children stood prolonged treatment very badly, and it was, in his opinion, much better in these cases to employ operative measures.
3. Cases where there was a focus of disease in a bone or joint. This focus must be removed before recovery could be established.

Dr Struthers Stewart gave an outline of his sanatorium experiences. The results are not up to expectation, and he could not say that there had been any great advance in the

last twenty years. There was a great need of widespread co-ordinated research. The layman was dissatisfied with their results as too few cures were obtained. It was very difficult to form an expert estimate of the efficiency of sanatorium treatment as a curative method in tuberculosis, but under existing circumstances this is the best treatment available at the present time.

Sir David Wallace expressed his views on the treatment of tuberculosis as it affected the genito-urinary system. As in other forms of tuberculosis, early diagnosis was the keynote to successful treatment. In renal T.B. there were three groups of cases—(1) early cases with practically no renal symptoms; (2) cases pointing to disease of the bladder and with no renal symptoms; (3) cases with no urinary symptoms at all but with a tumour in the loin. The organism may be found in the urine, sometimes only after many careful searches. The disease in this system is almost always secondary and usually unilateral. While the general treatment is extremely important, he strongly advocated active operative measures in renal T.B. He uttered a warning in regard to the use of catheters, which often introduced secondary infection with very serious consequences. After operation, time and energetic general measures complete the cure. He quoted typical cases with pathological specimens in support of his beliefs.

Mr Logan Turner discussed the bearing of tuberculosis of the larynx on the prognosis and treatment of general T.B. with statistical illustrations. The treatment of lupus of the larynx was essentially surgical. The treatment of tuberculosis of the larynx was the treatment of tuberculosis itself. If only the intrinsic part of the larynx was involved the prognosis was not grave, but where the external parts became involved prognosis was very grave; in fact, hopeless.

Dr Hewat was of the opinion that before a definite diagnosis could be made in tuberculosis the heart condition must be looked into. If there was a disordered action of the heart this must be watched carefully and conditions arising from this must be closely investigated before a diagnosis was made. He

illustrated the importance of this by referring to many cases seen among the troops where a diagnosis had been made before the heart condition was looked into, and where the results of treatment had not been very successful. Attention must be paid to the systematic side of pulmonary tuberculosis.

Dr Sim said that, as far as the eye was concerned in tuberculosis, there were three groups of cases prominent—(1) acute infection of the globe, a pseudo-glioma; (2) T.B. of the ciliary body; (3) certain chronic inflammatory affections of the conjunctiva and cornea in children, which are so easily treated, and which result in much impairment of vision in after life if left untreated. He wished an institute such as the Alton Institute could be established here—a hospital where these children could have proper treatment.

Dr Chalmers Watson said that in his opinion the gravity of the condition in many cases of tuberculosis depended much more on the degree of secondary infection by various pyogenic organisms than on the direct action of the tubercle bacillus.

Dr George Mackay regretted that more information had not been given as to the best means of early diagnosis. He put forward a plea for more efficient supervision of dairies—the essential prophylactic treatment. He was a great believer in Koch's old tuberculin, and agreed entirely as to the necessity for prolonged periods of treatment.

Professor Caird remarked that in the treatment of tuberculosis, joint rest and fixation were always kept in view by the surgeon. The popular view was that treatment of this disease must be prolonged, and that conservative methods were much the best; surgeons, however, tried to shorten the illness by operative measures, etc. He would have liked to hear more about the use of tuberculin in treatment, as he himself had never seen very good results follow its use. He also was convinced that the removal of the diseased part did much good. The surgeon did so much, and nature did the rest. If the diseased part was not removed tubercle must necessarily recur, and in his opinion surgical methods of treatment were essential in very many cases, and had very good results.

In reply, *Sir Henry J. Gauvain* said that surgery did have a place in the treatment, but that its scope was becoming smaller daily. He could not agree that a tuberculous focus in bone near a joint should be removed, for in his experience in the late after-treatment of cases after operation, which seemed at the time to have been successful, he had been disappointed. As regards tuberculosis of the kidney, he thought removal of the organ the best line of treatment. Vaccines were of no use in old sinuses unless an acute infection supervened. As regards the relative percentage of human and bovine tuberculosis, he believed that in Edinburgh bovine was much the more common. He had only found 27 per cent. bovine in his observations.

Special Clinical Meeting.—May 19, 1920

Emeritus-Professor F. M. CAIRD, *President, in the Chair*

I. EXHIBITION OF PATIENTS

1. *Miss Gertrude Herzfeld* showed—

Two cases showing the earliest stage of TORTICOLLIS—so-called "TUMOUR OF STERNO-MASTOID."

(*a*) J. C. First seen 6th January 1920; æt. $\frac{4}{52}$. Tumour size of large hazel nut in substance of lower third of sterno-mastoid. No asymmetry of face.

(*b*) J. R. Seen 19th February 1920; æt. $\frac{3}{52}$. History of difficult birth. Hard tumour in sterno-mastoid, size of pigeon's egg.

2. *Prof. G. Lovell Gulland* showed—

(*a*) A case of ADDISON'S DISEASE.

(*b*) Two cases of LEUKÆMIA treated with radium.

3. *Professor F. D. Boyd* showed—

(*a*) Case of PERNICIOUS ANÆMIA. Intestinal symptoms pronounced. Transfusion. Operation for appendicitis. Question of vaccine therapy.

(*b*) Case of PERIPHERAL NEURITIS of unusual origin. Wassermann reaction positive. Improvement under N.A.B.

4. *Dr J. S. Fowler* showed—
Two cases of DECAPSULATION OF THE KIDNEY.

5. *Dr Fergus Hewat* showed—
W. H., æt. 26. This case illustrates the importance of symptoms of "disordered action of the heart" (D.A.H.) in relation to the early diagnosis of pulmonary tuberculosis. It also shows the importance of persistent sputum examination if direct bacteriological proof of the disease be demanded, as T.B. were found on the 28th consecutive examination.

6. *Mr Scot Skirving* showed—
Two patients with local TUBERCULOUS LESIONS in very unusual situations, presenting great difficulty in diagnosis.
(*a*) Tongue. (Female case.)
(*b*) Lip. (Male case.)
Microscopic sections by Dr James Miller.

7. *Mr D. P. D. Wilkie* showed—
(*a*) SARCOMA OF JAW. Male, æt. 43. In September 1913 left upper jaw removed for sarcoma (large round-celled). In July 1914 recurrence the size of a hen's egg removed from the same situation. Two short exposures to radium given. In June 1915 returned with extensive recurrence, pronounced inoperable. Tumour continued to grow and attained great size. In February 1919 patient took influenza and pneumonia. Tumour began to recede till it reached present dimension. Now under treatment with Coley's fluid.
(*b*) PRIMARY TUMOURS OF AXILLA. Two female patients. In each case tumour developed in pectoral wall of left axilla. No involvement of mamma. Microscopically in both cases tumour showed the structure of a perithelioma. In one case local recurrence after two and a half years showed change from cylindroma structure to that of a sarcoma.

8. *Mr John Fraser* showed—
Five cases illustrative of ILEO-TRANSVERSOSTOMY with resection of the lower end of ileum, cæcum, and ascending colon :—
(*a*) Baby 6 weeks old, for gangrenous intussusception.

(*b*) Boy 5 years old, for acute gangrenous volvulus.

(*c*) Boy 15 years old, for ileo-cæcal tuberculosis.

(*d*) Man æt. 38, for thrombosis of the mesenteric vessels with gangrene.

(*e*) Woman æt. 78, for malignant disease of the ileo-cæcal junction.

9. *Mr J. M. Graham* showed—

(*a*) Case of resection of the upper end of the humerus for necrosis following infected compound DISLOCATION OF THE SHOULDER.

(*b*) Case of TUBERCULOUS DISEASE of the ileo-cæcal segment treated by resection.

10. *Mr A. Pirie Watson* showed—

(*a*) Embolism and thrombosis of the mesenteric blood-vessels—Resection of $7\frac{1}{2}$ feet of small intestine—Lateral anastomosis—Recovery—in a woman æt. 63. Operation on 13th April 1920—twenty hours after the onset of symptoms suggesting acute intestinal obstruction.

(*b*) Fracture of the os calcis, presumably produced by muscular action, in a man æt. 50. Accident—2nd March 1920—while crossing a stile in the country, he tripped on the top step and fell forwards full length on the ground. The condition was diagnosed and treated as sprain. Persisting tenderness suggested X-ray examination, when the fracture of the calcaneus was discovered. Subsequent treatment by plaster of Paris ambulant splint and later by a boot with crooked heel and raised inner sole has proved satisfactory.

11. *Dr W. G. Sym* showed—

A case of RECURRENT PARALYSIS of the THIRD NERVE.

12. *Dr H. M. Traquair* showed—

A case of BITEMPORAL HEMIANOPIA with enlargement of the sella turcica but no other obvious symptoms.

13. *Dr Douglas Guthrie* showed—

Three cases showing RECONSTRUCTION OF NASAL BRIDGE by means of rib cartilage.

(*a*) G. E. Injury to nose two years ago. No deformity then, only nasal obstruction. Treated by operation (probably resection of septum). Six months later bridge of nose gradually sank in, causing great disfigurement. W. R. negative. Operation, 5th April 1920. Removal of septal spur left side. Transplantation of piece of seventh costal cartilage into nose to form new bridge.

(*b*) L. L. Fell downstairs and broke her nose ten years ago. Considerable deformity resulted. Paraffin injections tried with little success. No nasal obstruction. Operation, 12th March 1920. Costal cartilage graft inserted under skin of nose.

(*c*) P. M. Aeroplane accident in March 1918. Nasal deformity and obstruction of left nostril. Operations, April 1920. Resection of septum and partial turbinectomy. Two days later, one inch of seventh costal cartilage (whole thickness) implanted into nose.

14. *Dr W. T. Ritchie* showed—

(*a*) Two cases of ATRIAL FIBRILLATION:—(1) Illustrating the value of continued administration of digitalis. Man, æt. 49, readmitted to Deaconess Hospital in February 1920, suffering for one year from cardiac failure as sequel to chronic myocarditis and fibrillation. Orthopnœa, œdema of lungs, albuminuria. Wassermann reaction negative. Recovery under digitaline intra-muscularly. Since March has taken digitalis tincture steadily and has remained free of symptoms. (2) Illustrating favourable prognosis in spite of ectopic ventricular beats. Man, æt. 64, known to suffer intermittently from dropsy for ten years. Seven and a half years ago since persistent fibrillation, associated with ectopic ventricular beats, first recorded.

(*b*) Case illustrating the relation of DISEASE of the AORTIC VALVE to SYPHILIS. Man, æt. 33, aortic incompetence, sinus rhythm, few symptoms of cardiac failure; Argyll-Robertson pupil, slurring speech, increased tendon reflexes. Wassermann reaction strongly positive.

Meeting VII.—June 2, 1920

Emeritus-Professor F. M. Caird, *President, in the Chair*

I. Original Communication

ENTEROPTOSIS AND ASSOCIATED CONDITIONS

(With Lantern Demonstration)

By HOPE FOWLER, M.B., F.R.C.S., and CHALMERS WATSON, M.D., F.R.C.P.

Mr President, Ladies and Gentlemen,—I have been asked by way of introduction to this discussion to give a demonstration on Enteroptosis, and record my impressions as to its frequency.

From the radiographic point of view there is a considerable amount of literature on the subject. Radiographers are unanimous in regard to its great frequency. There is room for different opinions as to what constitutes the normal position of the stomach, cæcum and colon; and in the forming of an opinion as to the existence of a true downward displacement one has to take into consideration not only the position of the viscera in the erect posture, but the extent to which that is changed for the better by change of position, allowing of the return to more normal tone of the anterior abdominal wall. That is a very important point to keep in view in estimating the existence and significance of a true ptosis; *e.g.*, if the lower border of the stomach in the erect posture reaches 2 inches below the umbilicus, we can safely allege the existence of gastroptosis. If the hepatic flexure lies within the iliac crest, we can safely conclude that there is marked proptosis. The severity of this proptosis will, however, depend upon the extent to which, in assuming the recumbent posture with a somewhat restored tone to the abdominal muscle, the hepatic flexure is capable of rising to a considerable extent.

I have not analysed the very large number of cases which I have examined each year for many years past, but my experience leads me to speak freely as to the great frequency with which cases of marked downward displacement of the

viscera are met with. I am speaking solely as a radiologist, and I have sometimes little knowledge of the clinical details of the illnesses which have led to an X-ray examination. I can, however, testify not only to the great frequency of enteroptosis in cases in which the symptoms or physical signs are mainly referred to the gastro-intestinal tract, but also to the frequency with which the condition is met with in certain more remote general conditions for which the investigation of the gastro-intestinal tract has been applied more or less as a routine measure, with the object of determining the existence of any defect which might possibly explain the clinical condition. It would, I feel sure, not be an over-estimate if I state that in two out of every three of all the cases I examined there is unmistakable evidence of a downward displacement of one or other part, often of all the main parts of the digestive tract, which can safely be regarded as pathological. It is hardly necessary to mention that a limited amount of information, or rather deduction, is often permissible from a single radiogram. The general conclusion can be more wisely drawn after a complete series has been taken.

In connection with the subject matter for discussion this evening, it is interesting to refer to the frequency with which, on careful radiographic examination, the presence of kinks and intestinal adhesions in different situations can be determined by use of the X-rays. This can be done more adequately by the screen examination, but often the lesions are brought out or strongly suggested by the X-ray picture.

In submitting to you a few slides taken at random from my series, I will illustrate cases of displacement of the stomach, the colon, etc., and draw attention to a condition to which too little has yet been directed—an associated downward displacement of the heart, or cardioptosis, a condition which I see referred to in Dr Chalmers Watson's paper. Apart from the actual unduly vertically hanging heart, attention should be drawn to the frequency with which one sees an abnormal broadening of the aortic shadow in cases associated with enteroptosis and associated stasis. It is a point of importance to which attention was first drawn by Jordan. I shall show you a series of representative slides, indicating in the most general way the clinical diagnosis which was associated with the condition.

1. A woman of about forty-five or fifty, suffering from pronounced general symptoms. Clinically regarded as neurasthenia.

2. A youngish woman. Chronic indigestion and asthenia of long duration. Here you will observe the pronounced downward displacement.

3. A youngish man, suffering from chronic ill-health of many years' duration, with a considerable degree of mental depression.

4. A girl of twenty, with vague symptoms, generally not thriving, general asthenia and constipation. Observe the condition of the stomach.

5. The same case. This slide shows the condition of the colon at the end of twenty-four hours, illustrating the downward displacement of both hepatic and splenic flexures, with great elongation and proptosis of the colon.

6. A woman under thirty. Chronic ill-health and asthenia. Note the downward displacement and great proptosis of stomach.

7. The same case twenty-four hours later.

8. The same case forty-eight hours later. Observe the downward displacement of the hepatic flexure and transverse colon.

9. A woman of about thirty-five years of age, suffering from chronic ill-health and lack of vigour.

10. A thin man of about thirty-eight, suffering from chronic ill-health, recurring attacks of abdominal pain and discomfort. Poor nutrition and general asthenia. Previously operated on and appendix removed some years ago. X-ray examination reveals a marked degree of gastroptosis and constriction in the ascending colon suggestive of local adhesions, which is confirmed at the operation. Jackson's membrane found at operation.

11. A young woman with marked anæmia and constipation, general asthenia of some years' duration. This slide shows a lesser degree of displacement.

12. A woman of about forty. Clinical diagnosis of colitis. Note the marked proptosis of the whole colon, involving the hepatic and splenic flexures, with great elongation of the transverse colon. Jackson's membrane found at operation.

13. Clinically abdominal distension, chiefly involving the right side, with chronic ill-health. X-ray examination shows dilatation of the cæcum and ascending colon.

14. A woman of about forty. Clinically diagnosed as hyperthyroidism, with asthenia. Note here also the downward displacement of the whole colon, with elongation.

15. A woman of forty-two, suffering from chronic ill-health and constipation. A good example of downward displacement of the colon. Retention in the ascending colon and the first part of the transverse colon. Note the typical double barrelling.

16. A woman of about thirty-four, suffering from chronic ill-health, with constipation. A repetition of the foregoing. This slide shows dilatation of the cæcum and ascending colon, with elongation.

17. A woman of about twenty-seven. Clinical diagnosis of chronic indigestion, with asthenia. X-ray examination shows a trace of gastric retention. Complete ileal stasis, found at operation to be associated with and probably dependent upon concretion in the appendix.

18. A man of about forty. Clinically diagnosed as asthenia, anæmia and constipation. Pronounced intestinal stasis, involving the small intestine. Found to be associated with a marked membrane attached to the ascending colon, also involving the terminal 2 inches of the ileum.

19. This slide illustrates as nearly a normal heart as one can find. It shows the curves, the height of the diaphragm, and the number of interspaces.

20. This slide shows cardio-vascular changes generally associated with visceroptosis. Note the vertically hanging heart.

21. A man of about sixty, suffering from asthenia and premature old age. Note the unduly pendant heart, with broadening of the aortic shadow. Observe also the evidence of old chronic lung lesion affecting the left apex.

REMARKS ON ENTEROPTOSIS AND ASSOCIATED CONDITIONS[1]

By CHALMERS WATSON, M.D., Physician to the Royal Infirmary, Edinburgh

THIS evening's discussion was suggested to me a few weeks ago by some remarks which were made at a short discussion on the subject at which I was present, in which one surgeon of wide experience expressed the view that enteroptosis was essentially a condition of women, rarely occurring in men, and a physician expressed the opinion that enteroptosis was not seen in children. As the subject is one to which I have devoted a good deal of attention for many years, and as my experience has led me to widely different conclusions, and as the subject is of very far-reaching clinical importance alike to physician, surgeon, and practitioner, I thought it would be useful to bring it before the Society.

The whole time at my disposal this evening could very readily be taken up on one of several aspects of this wide subject. I can briefly present my main points in the following order :—

1. *Introduction.*—Most clinicians are aware of the comparative frequency with which patients are operated on for a diagnosis of gastric ulcer, chronic disease of the appendix, gall-bladder, etc., in which the condition is found to be due to a visceroptosis, this condition including a dilated, mobile cæcum, Jackson's membrane, similar membranes in connection with the splenic flexture, so-called Lane's kink, and other adhesions. In other cases where a distinct if not very pronounced pathological condition of the appendix is found, in association with a dilated and unduly mobile cæcum, it is sometimes a matter of difficulty to determine whether the appendix is primarily at fault, or whether the affection of the appendix is secondary to the disorder of the larger bowel. In a well-marked case of ptosis the stomach is found affected, the duodenum abnormally mobile and dilated, the colon lengthened and dilated, the cæcum unduly wide and mobile, the transverse colon elongated with

[1] Introduction to a discussion on the subject, Edinburgh Chirurgical Society, 2nd June 1920.

some prolapse of the solid viscera. Most attention has been paid to this subject by American writers, who have enlarged upon two varieties of skeletal changes which are recognised—one being known as the *virginal*, and the other the *maternal* type. *In the former*, the skeleton is thin, poorly developed, narrow thorax; shallow from before backwards, narrow epigastric angle, upper abdomen narrow, shoulders round, lumbar curve diminished, and general muscular weakness. It is recognised that only a relatively small proportion of these people have abdominal symptoms. *In the maternal type*, so-called, there is no alteration of the skeleton. The patient is well built, thorax is capacious, relatively wide upper abdomen, abdominal muscles atrophied, lumbar curve diminished or lost, and shoulders round; and here again it is recognised that only a relatively small proportion of such patients suffer inconvenience.

2. *Theory of Formation of Bands and Membranes.*—These are found with great frequency at operations, both in cases where their presence is suspected and otherwise. Different views are entertained regarding their formation—

(1) That the membranes and bands are congenital.
(2) That they are the result of chronic intestinal stasis.
(3) That they are the result of chronic inflammatory changes.

Then, again, in conditions of ptosis associated with these membranes, opposing views are held as to the relation of ptosis to the membranes. According to some, the ptosis is the primary factor; according to others, the membranes are the cause of the ptosis. In the latter instance, the writers clearly regard the membranes as of so-called congenital origin. As regards the frequency of the condition, some writers find ptosis four or five times more common in women than in men; others find the condition only slightly more frequent, the proportion recorded in one American paper being in a large number of cases six to five.

3. *Conditions induced by the general Visceroptosis or more localised Enteroptosis.*—Visceroptosis may produce symptoms which may simulate disease of the appendix, gastric ulcer or duodenal ulcer, cholelithiasis, and even malignant disease of the stomach; in pronounced cases the general symptoms are those

commonly associated with the clinical picture present in advanced intestinal stasis. I am restricting my remarks to the condition of the colon.

4. *Personal Experience of over* 500 *Cases.*—Before referring to this I may first of all define enteroptosis. I mean a condition in which the hepatic flexure is well below the iliac crest in the erect posture, the transverse colon showing clear evidences of downward displacement, with marked elongation. I should add that it is a necessary part of the diagnosis that the assumption of the recumbent posture is not accompanied by a marked improvement in the position of the displaced viscus. In my series of 510 cases (this series comprises all the cases in hospital and in my private practice which were submitted for routine radiographic examination of the digestive tract), a marked downward displacement of the colon, with clear evidence of elongation and sagging in the transverse colon, was present in 330 cases, *i.e.* 65 per cent. The proportion in the sexes works out roughly at three women to two men. A lesser degree is common in quite young children, and it is possible to trace every stage of the development of the condition from adolescence upwards. Striking clinical accompaniments are—

(1) A weakening of the anterior abdominal wall.
(2) Defective action of the diaphragm; lack of knowledge of efficient respiration; defective development of the chest, frequently a sequel to adenoid growth, or latent tuberculosis.
(3) In the later stages there is a general stasis in the abdominal, venous, and lymphatic systems, and a tendency to cardioptosis, with general arterial disease.
(4) Last, but not least, a catarrhal change in the lining membrane of the bowel, which plays an important part in the development of the general toxæmic state associated with it.

The Manner of Development.—On this point I find myself in general agreement with the teaching of the Lane School. From the radiologist's point of view, an admirable account of this is presented in an article by Dr Jordan, published in the *Lancet*, 1920, I. 756. In men the viscera are kept in their place normally by the muscles of the anterior abdominal

wall, and in health these muscles retain their tone while the individual is upright. An adverse cycle, which leads ultimately to severe stasis, starts in early childhood. Artificial feeding, with its tendency to overfilling of the stomach, weighs down the transverse colon, the contents of which tend to stagnate. The tension thus exerted on the mesentery interferes with peristalsis. This is followed as a result of the straining by a gradual elongation of the pelvic and later the higher colon. Stasis follows with all its accompaniments. One of the important accompaniments is the general weakening of the abdominal muscles, as a result of which the muscles relax and the viscera fall. When the abdominal muscles fail, the mesenteries act as ligaments and support the bowel. The mesenteries are not suitable to act as ligaments, and one of two results follows :—

(1) Either the mesentery slips down from its general attachment, in which case we get the phenomenon presented in the classical picture of general visceroptosis with all its sequelæ ;

or (2) The mesentery makes an effort to adapt itself to its new rôle, and becomes thickened where the strain is greatest, with the result that some parts of the bowel are held up.

The second result occurs more commonly in more robust subjects, but the bands which follow constitute the various kinks and membranes which are found by the surgeon. First they form a local thickening in the mesentery at the points of greatest strain. As they develop they may form firm bands attached to the abdominal wall, opposite to the mesenteric attachment. Such bands are commonly found in the left iliac region supporting the bowel at a single point ; at the splenic or hepatic flexure ; at the ascending colon, forming a Jackson's membrane ; at the terminal coil of the ileum ; and at the lower border of the liver. These bands aggravate the vicious circle. They produce trouble not only through mechanical obstruction, but act as an irritant focus which sets up spasm, often followed by torsion of the bowel. They cause local dilatation of part of the bowel, local catarrhal changes which induce general toxic absorption, and so the circle goes on.

I have been present at a very large number of operations where these various adhesions have been found, in cases where the antecedent history was well known to me. I know of no evidence in favour of the view that these bands or adhesions are of congenital origin in the sense in which it is commonly regarded. That there is a marked predisposition to the disease few will deny. This brings it into line with other common diseases such as tuberculosis, epilepsy, etc., which we do not regard as congenital. The bands and adhesions are produced by Nature's attempt to correct the growing weakness, aggravated by secondary inflammation and toxic changes, and, as I have already indicated, an important factor in their etiology is found from the thoracic side, where we have defective development of the chest, defective action of the diaphragm which subsequently becomes displaced downwards, contributing materially to the clinical picture in the cases occurring in early life. In cases of enteroptosis occurring in adult life, the condition is entirely due to a slowly developing abdominal lesion, arising mainly from constipation and muscular atony of the abdominal wall and muscles generally, here also greatly aggravated by defective diaphragmatic action on respiration.

The condition is of far-reaching importance from the point of view of the practitioner. Enteroptosis may and does exist for a long time without producing clinical symptoms, but I have never found a case of enteroptosis occurring in a man or woman who was in an A1 category of health. Sooner or later a definite clinical picture arises which varies widely, mainly in proportion to the degree of toxic changes which are invariably associated with it at some time or other. The careful examination of the stools, and in many cases the urine, will reveal objective evidences of profound putrefactive changes, with alterations in the bacterial flora which have important etiological significance.

With regard to treatment little need be said,[1] except to emphasise the importance of early prophylactic treatment as the only means of treatment which can possibly be curative. For all practical purposes the one and only method of treatment is that of physical therapeutics: appropriate massage,

[1] A full account of the surgical treatment of advanced cases is given by Mr Walton in the *Medical Annual*, 1920.

and still more appropriate exercises, directed to correct the defects both on the abdominal and the thoracic side. Even in fairly severe cases something can be done to get rid of the associated conditions arising from the toxæmia associated with the catarrh of the bowel. Time and again I have seen remarkable recoveries from clinical symptoms, with comparatively slight improvement in the position of the viscera as revealed by subsequent X-ray examination. In the treatment of all cases it is important to recognise that there are three factors requiring to be dealt with in varying degree in different cases—

(1) The mechanical factor.
(2) The toxic factor.
(3) The psychical factor.

There is no question that the psychical factor can and does play an important part in inducing the symptoms present in many cases of enteroptosis. A powerful emotion can depress the neuro-muscular tone, and probably also has an influence on diminishing the resistance to abnormal bacterial activity in the bowel. It is equally true that psychical stimuli of an appropriate kind may play a useful part in the treatment, and get rid of secondary symptoms without in any way modifying materially the position of the viscera. The success in the management of these cases will depend on the practitioner's skill in assessing the degree to which the mechanical factor, the toxic factor, or the psychical factor is at fault.

[The series of slides shown at the meeting were taken from patients at present under observation, and include cases of "Indigestion," Gastric Ulcer, Neurasthenia, Bright's Disease, Arthritis, Exophthalmic Goitre, etc.].

Discussion.

Professor Robinson said that although he was entirely cut off from studying cases from the clinical aspect, occasionally rumours reached him of what was going on in that department. Sometimes these rumours surprised him. In the dissecting room, his experience of enteroptosis and visceroptosis had been that these conditions were found mostly in old people, when, so far as known, no diagnosis of the condition had been made. Bands and kinks were found in many cases where there was no

reference to anything of the kind having been noted during life. He referred to the case of a woman aged fifty-seven, with no history of any previous illness, and who had apparently died from pleurisy. He found the cæcum reversed and a kink in the ascending colon. There had been no reference made to this condition at any time during life, and she had not been troubled by any symptoms. Possibly all these bands and kinks were congenital, and were present before birth, and accentuated after. He was dealing only with abnormal cases, and he referred to his examinations of still-born children, where he had found adhesions very much stronger in some places than in others. If these adhesions were present, the intestine was liable to become strained and Lane's band might develop. In many cases the band was there and the kink was there, but these had never at any time troubled the patients during life, and they died of some quite different disease. In his opinion, kinks, bands, etc., were of very little practical importance in ordinary circumstances. He thought that every person had kinks, etc., but comparatively few of us were ever troubled with them, and they did not have any important effect on our health. In his opinion, most of the bands disappeared in ordinary life, but even if they remained they gave little or no trouble. It was very difficult for him to form an exact opinion about the condition in many cases, as he was not shown any picture of the stomach, etc., of the patient, and was told nothing of the previous history in most cases. He believed that much of what was put down to the intestine was really part of the general incapacity of the individual. An individual might be below the normal in every way—not because of disease of any kind, but simply because he was abnormal and had been so from birth, and never could be normal. This type of individual was often said to be ill. These bands, etc., did not cause any result in people who otherwise were normal individuals. If skiagrams of people who had never been in a doctor's hands in their lives were compared with skiagrams of people suffering from some disease or other, the similarity of the skiagrams on many points would be clearly seen.

Professor Sir Harold Stiles said that of all the subjects on the border-line of medicine and surgery, that of visceroptosis

probably interested him most. In most cases the patient had been treated by the physician, the gynecologist, and ear and throat specialist before coming to the surgeon. The surgeon therefore saw the late cases, but the important point was the origin of the condition.

There must be an anatomical and developmental cause for the condition. The perfectly normal person, in the sense of the anatomist or sculptor, was the exception rather than the rule, but within certain limits of variation many persons might be regarded as normal, and there might be considerable departures from this and yet no symptoms might arise. There were often physical defects which in the first instance did not lead to disease. There were variations in the skeleton, and the long and slender type supplied the cases of visceroptosis.

In certain families it was not difficult to understand from the configuration why there might be displacements of the stomach, kidney, ovary, colon, or uterus. Diversity must be expected in the number and position of folds because of the complexity of development of the intestine and peritoneum. Certain children were born with a degree of visceroptosis, and it was only a question of time till symptoms might arise. The proximal part of the colon, because of the way in which it was slung and because of its greater absorptive function, gave rise to symptoms much more readily than the distal part. The formation of various bands was described. The absorption of toxins lead to faulty muscular tone, involving both voluntary and involuntary muscle. Innervation was interfered with, adipose tissue was lost, and the viscera tended to slip downwards. An essential in treatment was physical education, and if this were carried out in children of predisposing type, the visceral and associated clinical conditions would not occur. Enteroptosis affected more women than men. It was more common among the unmarried and the married without children, and it was possible that there was a subtle something, possibly of a sexual nature, which determined the onset of the symptoms. In bad cases a plaster cast should be taken and supports made from it. Exercises were essential. In the neurasthenic cases, with severe symptoms, removal of the proximal part of the colon was of benefit in carefully selected cases. He had done the operation in 60 cases. He had been able to follow 27; and in a third of

these there had been great improvement, in one-third some improvement, and only in 2 cases was there no benefit.

Professor Caird said Dr Chalmers Watson had laid special stress on three points—

(1) The causes which are at the base of this condition.

(2) Conditions which arise from it.

(3) The question of treatment.

He thought that it was rather remarkable how much literature on this subject had been written by transatlantic writers. When in Copenhagen he had been surprised by the enthusiasm shown there on this subject. The cases were classified into two groups—male and female; and the female were again classified into two groups—virginal and maternal—as referred to by Dr Chalmers Watson. The former had no relaxation of the abdominal wall, and suffered from enteroptosis very severely and had considerable pain. The latter was the woman who had relaxation of the abdominal wall and might suffer little or no pain. Much might be done to prevent the condition, chiefly by educational methods, abdominal exercises, swimming, etc., etc. With regard to the support question, he thought a great deal could be done in this way to help the condition. The symptoms, however, often reached a stage when the surgeon had to be called in and operation was very often successful.

Professor Meakins did not think visceroptosis should be called a disease. To call it a "condition" was all right, but not a "disease." The involvement of other organs such as the heart or the lowered position of the diaphragm were not complications, but were part of the general disfigurement of the patient. Was a long pendulous heart not as good as a transverse heart? Another point he wished to bring forward was in regard to toxic absorption. A dilated cæcum was frequent enough in a very large number of cases, but some other factors must be brought into play to cause the dilated cæcum. What was the indication of toxic absorption? He thought we knew really nothing about this point. So many of the symptoms were laid down to toxic absorption, where we had no evidence of this absorption taking place. Until we had

some definite proof of this, it would be better for us if we did not put so much stress on what he called a "phantom" condition. He agreed with Sir Harold Stiles in regard to treatment and in the view he held about the belt being made for the patient. In his experience, an ordinary belt often did more harm than good. He had not as yet seen many cases which had derived much benefit from an operation, and he thought that in regard to this point a very careful selection of the cases for operation was essential.

Mr Dowden thought there was certainly a congenital variety of symptoms connected with this condition. He was also certain that there was an acquired type of symptoms, and that this was the type most commonly seen in women at the present time. He thought every woman had visceroptosis. The lower part of their limbs was interfered with by wearing tight corsets; the liver went down and the right kidney went down, and this caused a visceroptosis. The symptoms, of course, might not be evident during life at all, unless something occurred which aggravated them and induced them to come further out. In his opinion, operation was not always successful, but he described two cases with kinks and inflamed appendix that had greatly benefited by removal of the appendix, and the patient had completely recovered. He thought the condition was most frequently seen in women. The belt certainly helped very much, but did not establish a cure. Referring to the influence of constipation and toxic symptoms on the condition, he described a case of a woman suffering from visceroptosis and all its signs, with pain in the abdomen, etc. He had found her looking very much better one day and had asked her why this was. She said the reason was that she had had no action of the bowel for a week, and that if the bowel was active the symptoms returned.

Dr Rainy referred to results obtained by him at Craigleith, after examination, with a bismuth meal, when the patient was in the erect posture. To get really satisfactory results, pictures in the vertical and horizontal positions must be taken and compared. When Dr Chalmers Watson referred to the normal condition, he rather took the ideal position of a normal; and in

many cases the transverse colon was at a lower level than that referred to by him. A transverse colon which was below the umbilicus was not necessarily diseased. There were two separate groups of cases, he thought—(1) cases of enteroptosis where the passage of food was distinctly delayed; (2) cases of just as severe enteroptosis where the passage of food was not so much delayed. In the first group the toxic symptoms were mostly seen, and such cases were in his experience comparatively common. He thought that the presence or absence of some degree of stasis in the large intestine was a very important point. Many cases were sent to Craigleith not to be cured of the symptoms, but just to have an investigation of the abdominal viscera made.

Mr Wilkie referred to an examination he had made of 400 post-mortem subjects. Bands such as were often considered as calling for operation were common, and the condition known as Jackson's membrane was very common, and yet no intestinal symptoms had been remarked. This membrane was even more common in still-born children. The musculature was more often the cause of symptoms than the existence of bands. A condition of dilatation of the duodenum was sometimes associated with bands, and he had pointed out the danger of duodenal obstruction and absorption in leading to toxic symptoms.

Mr Struthers thought congenital weakness was the reason for symptoms occurring. It was very difficult in most cases to see from the patient's appearance that anything was wrong at all. We lacked the knowledge of what the real average condition was. We would need to see a much more extended series of radiograms than we had seen, before a definite decision could be come to regarding the condition.

Dr Bramwell referred to the origin of the condition, and remarked that no one had referred to the vicious circles and the part played by the emotions. He described two cases illustrative of the depressing effect of the emotions on the condition. One was a case of a man who had been quite well in the morning and had gone to the office expecting to receive

an important letter there, which he had expected to receive for some time. No letter was there, and he returned home in the evening a wreck. He was sent to bed and the doctor was called in. The case was very clearly one of meningitis. All this had been the effect of the emotions. The second case was that of a very healthy woman who one day saw one of her children nearly run over by a cab. She had a series of fits shortly after—caused by the emotions; she could not forget what she had seen. In many cases the patients really were suffering from depression. If a neurasthenic were told he had a movable kidney, *e.g.*, his thoughts would centre on that, and the results would probably be unfavourable. Improvement, he thought, depended on the condition of the general health, and it was important to avoid inducing an anxiety neurosis.

In replying, *Dr Chalmers Watson* said he agreed with Professor Robinson in regard to the absence of evidence of the disease being of congenital origin. He also agreed with Sir Harold Stiles in everything, except on the same one point. He was not convinced that the disease was congenital in origin. There was a predisposition to the disease—the disease was only congenital in that sense—and the development of symptoms could be prevented by appropriate treatment. Because of this, one must not lay too much stress on the congenital point. Enteroptosis frequently existed without producing any symptoms at all. Sooner or later, however, in a large proportion of cases, symptoms of definite toxæmia occurred, which revealed themselves in many directions. Professor Meakins appeared to think that it was somewhat loose and unscientific to speak of toxæmia in these cases until we had determined the nature of the toxine. That criticism was, in the speaker's view, quite erroneous. If Professor Meakins were to adopt a logical position, he would not prescribe an aperient remedy to relieve the symptoms of constipation and all its attendant discomforts —which were very largely toxæmic in origin—because we had not a sufficiently precise knowledge of the nature of the toxines responsible for the symptoms. To deny the existence of toxæmia in the cases in question was, in the speaker's view, not in accordance with all carefully considered clinical experience. If a sufficiently thorough investigation of the stools and

the urine in these cases were made, abundant evidence of undue putrefaction in the digestive tract would be found. A great deal could be done to correct symptoms if the treatment was begun early. Sir Harold Stiles and other speakers had laid emphasis on the congenital origin of enteroptosis, but they had to a great extent nullified their own criticism by pointing out the great value of physical therapeutics as a prophylactic and as a corrective. The speaker was in entire agreement with the favourable opinion expressed as to the pre-eminent value of treatment by physical methods. The great defect at the present time, both in hospitals and private practice, was the necessity for the wider recognition of the value of treatment by physical methods, and the provision of facilities for applying this. Dr Bramwell had rightly laid stress on the importance of the psychical factor. The lack of skilful handling of these cases on the part of the practitioner frequently led to the development of an anxiety neurosis. As he pointed out in his paper, the skill in the handling of these patients depended upon the practitioner's recognition of the extent to which the symptoms in any given case were dependent upon—

(*a*) Displacement of the bowel.
(*b*) Associated constipation.
(*c*) The toxæmia arising from the abnormal putrefaction associated with the constipation.
(*d*) A psychical factor.

Meeting VIII.—July 7, 1920

Dr Edward Carmichael, and later Dr Fleming, *in the Chair*

I. Election of Member

Mary Laurie Walker, M.A., B.Sc., M.B., Ch.B., Department of Physiology, Edinburgh University.

II. Original Communications

1. HERPES AND CHICKENPOX

By CLAUDE B. KER, M.D., F.R.C.P.Ed., Medical Superintendent, Edinburgh City Hospital.

A CONSIDERABLE amount of interest has been taken recently in the question of the alleged relationship of Herpes and Chickenpox. Although at first sight it may appear extremely improbable that there is, in reality, any connection between two conditions which we have been accustomed to consider as entirely separate entities, and which in the vast majority of cases present only very superficial resemblances, a study of recent literature on the subject will, I think, compel an unprejudiced reader to regard the question as one well worthy of serious discussion. Speaking for myself, while I must confess I was for long incredulous, and quite satisfied to regard the interesting occurrences reported from time to time in the journals as merely due to coincidence, I have been driven by personal experience and the gradually accumulating reports of others to the belief that it is not impossible that there is a real connection between these apparently different diseases. If, as has been recently suggested, the same virus may possibly be responsible for such different manifestations as the symptoms of influenza, poliomyelitis, and encephalitis lethargica, there is no valid reason why a similar relationship should not exist between chickenpox and herpes, and the evidence, indeed, in the latter case seems considerably stronger.

Bokay in 1892 reported that he had seen nine cases in which chickenpox appeared from eight to twenty days after an attack of herpes zoster had affected another person in the same family or hospital ward, and when the possibility of the chickenpox having arisen from any other source could apparently be excluded. Of recent years numerous similar occurrences have been described by a large number of observers, and it may be added that any mention in a medical journal of the suggested relationship of the two diseases is apt to be followed by several letters noting instances in which herpes was followed by an outbreak of chickenpox among the members of the family of the original patient.

Before discussing, however, the cases which have hitherto been reported, it may be well to consider if, by any possibility, errors of diagnosis may account in some degree for the now acknowledged frequency with which one of these diseases follows the other. Are there, in the first place, abnormalities in the distribution of the eruption of chickenpox which might tend to a diagnosis of herpes being arrived at, and in the second place can the herpetic eruption assume such a character that chickenpox might be reasonably suspected? Both these questions can undoubtedly be answered in the affirmative.

1. *Abnormal Distributions of the Chickenpox Eruption.*— It is of course well known that in smallpox a concentration of the eruption may be determined by local pressure or irritation at any particular part of the body, and sometimes in areas where, under ordinary conditions, the pocks may be confidently expected to be sparsely scattered. Good examples of such concentrations are not infrequently observed after the application of a mustard-leaf during the initial fever and at the site of the collar-stud or the garter. It is not perhaps so well appreciated that the eruption of chickenpox may be influenced in its distribution by similar causes, although the normal distribution in this disease is such that we would not naturally expect such abnormalities to occur nearly so frequently as in a fever in which the distribution appears to be determined by comparative amount of exposure, friction, and irritation of the different areas of skin as is the case in smallpox. Nevertheless we occasionally see in chickenpox a concentration of the eruption over the parts covered by the napkin in young infants. I have also had under my care a boy whose clavicle was fractured during the incubation period, and the shoulder, arm, and forearm, as well as the side of the chest, which had been covered with the bandage, presented a spotting at least three or four times more profuse than that on the unaffected side. Another recent case, a young lady who had very typical discrete chickenpox lesions on the trunk, showed on her face such a profuse and closely-set eruption that she gave quite the impression of smallpox, especially as the brow and prominences of the face were much more affected than the less salient parts. This was easily explained by the fact that she had recently returned from a week-end in the country,

where she had spent her time sitting in the sun, and the irritation of the sunburn had determined the localisation of the eruption. Similar cases have been reported by Gautier as occurring during a course of heliotherapy. Another patient, who developed his chickenpox only four days after an intense scarlet fever rash, had an unusually copious eruption on the trunk and extremities, and yet had only two or three spots on the face. This suggested that, had not the fever occurred during his incubation period, he would probably have had a very scanty eruption, but the skin hyperæmia caused it to be profuse on the trunk and limbs, whereas the face, spared by the scarlet fever rash, presented, as it were, more resistance. It is noteworthy that in this patient the forearms were affected quite as much as the trunk—not a very common occurrence in varicella.

Hamburger has suggested that some of the alleged cases of herpes zoster which have been followed by chickenpox may have, in reality, been cases of chickenpox itself, with the eruption determined in its localisation by such a cause as the pressure of badly fitting corsets.

I have seen two instances of undoubted chickenpox commencing with a typical herpetic arrangement of the eruption which afterwards became general over the body. As will be seen below, it might be possible to consider these cases as examples of the concurrence of chickenpox and herpes in the same individual, and, indeed, Dr Le Feuvre, the protagonist of the theory of the identity of the two conditions, has in a letter to myself already claimed them as such. In the meantime I prefer to put them on record merely as illustrating a possible anomaly in a chickenpox eruption.

CASE I.—A small girl developed what appeared to be an absolutely typical herpetic patch over the left shoulder-blade. Next day, however, a few outlying vesicles, one apparently typical of varicella, appeared in the neighbourhood of the patch, and one or two more on the right side of the back. There was nothing at any time below the waistline, and nothing on the face, scalp, or limbs. I sent her to a chickenpox ward, where she did not contract the disease, and, seventeen days after the date of her removal, one of the children who had been exposed to her developed chickenpox.

CASE II.—A little girl, a few days after admission with diphtheria, developed a copious herpetic eruption. The distribution on the first day was entirely limited to the area supplied by the posterior divisions of the dorsal spinal nerves, but was equally well marked on both sides. Next day there was one spot on the face and herpetic groups above both elbows, limited apparently to the supply of the upper division of the external cutaneous branch of the musculo-spiral nerve. On the succeeding days, however, other vesicles much more typical of chickenpox appeared on the flanks, chest, and abdomen, and two other children in her own home were reported as having developed ordinary chickenpox on the day of her attack.

2. *Generalisation of the Eruption of Herpes Zoster.*—Parkes Weber has reported two interesting examples of this unusual condition, and has gathered from the literature some twenty references to it. He quotes, in particular, Minet and Leclercq, who collected twenty-five cases of generalised herpes, and who state that the aberrant vesicles may appear simultaneously with the outbreak of the typical zoster or may develop from a few hours to a few days after it. The latter was the case with Parkes Weber's patients, in whom the generalised eruption did not manifest itself for five days after the zoster in one instance, and at the end of the first week in the other. It may be noticed that in my own two cases of herpetic arrangement in chickenpox the original diagnosis was herpes, and the typical chickenpox eruption did not commence to develop for at least twenty-four hours afterwards. In these cases of generalised herpes we find the aberrant vesicles described as resembling closely those of varicella. They seem to be less deeply seated than those of herpes, and heal more quickly and with less cicatrisation. In one of Le Feuvre's papers an account of nine cases collected from the literature is given, and there seems to be no doubt in his mind that the condition is one of herpes and chickenpox combined. I have myself only seen one case which I can regard as one of generalised herpes.

CASE III.—A male of fifty-five years was sent into hospital as suspected smallpox. He reported that five days previously he had suffered from shivering and pain in the lower part of the back. On examining him I found a few dry vesicular lesions on the scalp, and one or two on the face. There were

several on the trunk, of which one or two were well filled and somewhat varicella-like, while others were dry and crusted. In particular, there was one very suggestive red-brown oval crust on the right shoulder-blade. Nothing of importance below elbows except one vesicle, and the legs were practically free of any spotting. Round the anus on the left side was a profuse eruption of typical herpes, with some outlying vesicles identical in appearance with one or two noticed in the sacral region. On the following day fresh herpetic groups were apparently struggling to appear on the inside of the left thigh, and a small herpetic patch was observed on the left side of the scrotum.

If we are to regard this case as one of generalised herpes, it may be noted that the eruptions, whether herpetic or varicella-like, appeared simultaneously. The pain in the back which caused the suspicion of smallpox was doubtless due to the fact that the sacral nerves were those chiefly affected by the herpes. I am far from being convinced that the scattered vesicles were in reality those of chickenpox. There was no history that the patient had suffered previously from that disease, but he could not state with any certainty that he had not had it.

Association of Chickenpox with Herpes.—Le Feuvre, who has done much to stimulate interest in this question, was able in 1917 to collect 50 examples of herpes preceding, following, or co-existing with chickenpox. Since that date several other instances of this curious association have been from time to time reported.

A. *Cases of Herpes Zoster followed by Chickenpox.*—It is into this group that most of the cases reported in the literature fall. A case of shingles occurs, and after an interval, approximating to the ordinary limits of a chickenpox incubation period, a contact, usually a member of the same family, develops varicella. Out of Le Feuvre's 50 cases no less than 41 are of this type, and 7 of these were observed by himself. In a paper of a later date he has added 2 more. In every case the interval elapsing before the appearance of the chickenpox fell between the limits of twelve to twenty-one days. To the papers of Le Feuvre, and that of Parkes Weber, full lists of references to the literature are appended, and I will content myself here with adding one or two more of recent date. A case has been reported by

Charpentier and two more by Cranston Low in an interesting contribution to the subject. Dingwall Fordyce adds yet another, Wilson another, and quite recently Taylor has given an account of four more. It is to be understood that in all these cases every care has been taken to exclude the possibility of the chickenpox having originated from some other source.

I take this opportunity of putting on record four more cases.

CASE IV.—On 23rd December 1918 a child, suffering from whooping-cough, developed a typical herpes zoster with no outlying vesicles. On 7th January a child in the same ward was discharged from hospital and developed chickenpox within a week of arriving home. The date on which the first spot appeared was not ascertained, but it was quite clear that the onset of the eruption was within twenty-one days of the appearance of the herpes in the other patient. A few presumably unprotected children, however, who remained in the ward, escaped.

CASE V.—A girl of eight, suffering from scarlet fever, developed a typical herpes zoster on 23rd September 1919. On the 11th October, eighteen days later, two sisters of five and six years, whose beds adjoined that of the herpes case, presented a characteristic chickenpox eruption, and on the following day a third child, aged nine years, who occupied the bed exactly opposite, also developed chickenpox.

CASE VI.—In the same year, 1919, a scarlet fever patient in another ward had a typical attack of herpes zoster. This was followed twenty-five days later by an outbreak of chickenpox affecting several children. As the herpes case was not removed from the ward, this long interval does not exclude a possible incubation period, as if infection was really derived from the herpes, it need not necessarily have been contracted during the first three or four days of that condition.

CASE VII.—In 1918 a child was admitted with chickenpox from Dr Fowler's wards in the Edinburgh Royal Hospital for Sick Children. I was assured by Dr Fowler that no case of chickenpox had been detected in the ward, but that it was interesting to note that a child had suffered from herpes zoster nineteen days previously.

In all these cases, in fact, any more natural source of infection was, as far as possible, excluded. As regards two of them, in

particular, it may be noted that they both occurred in convalescent wards, that is to say in wards to which no patient who has been less than three weeks in hospital is by my rules ever admitted. This practically prevents infection being introduced by a patient who comes into hospital with a few unrecognised crusts of chickenpox on the body, as such an individual would cease to be infectious long before the three weeks elapse. Again a missed case, for instance a patient whose sole eruption consists of one vesicle, a phenomenon which I once observed in a patient who had been quarantined after exposure to chickenpox, would almost certainly be free from infection before being transferred to the convalescent wards.

Here, then, are 13 more instances of chickenpox following herpes to add to the 41 originally collected by Le Feuvre and to the 2 which he subsequently reported, or 56 cases in all. No doubt there are many more in the literature.

B. *Cases of Chickenpox followed by Herpes.*—It appears to be much more unusual for herpes to follow chickenpox within the limits of a possible incubation period, but none the less such cases have been reported. Le Feuvre collected five in his series, and in a later communication added one more. I am unable to add any to this number, neither having had this experience myself nor having noticed accounts of any such occurrences in the literature since 1917. The number, indeed, appears to be so small that the theory of coincidence might, so far as this group is concerned, be more readily entertained.

C. *Cases of Herpes and Chickenpox in the same individual at the same time.*—It has been mentioned above that the two cases which I have preferred to describe as examples of chickenpox starting with a herpetic distribution, might be regarded as instances of this combination, and it will be admitted that generalised herpes may account for some of the cases reported, especially if they are not followed, after a suitable interval, by an outbreak of chickenpox. Thus the rash, "indistinguishable from varicella," which appeared a week after the onset of characteristic lumbar and dorsal herpes, recently described by Downes, might well have been generalised herpes, and, as the children of the family had never had chickenpox and did not contract it, this presumption is to some extent strengthened. Le Feuvre includes 4 cases in his series of 50 which he is

satisfied were in reality instances of herpes followed in the same individual by chickenpox within a few days, two days to a week. I have not noticed any others in the recent literature. My friend, Dr Scotland of Colinton, has told me that one of his patients, a lady of fifty, developed a severe attack of chickenpox a fortnight after the appearance of lumbar herpes. The interval here is much longer than has usually been noticed and we can hardly explain such a case either on the theory of a generalised herpes or of a chickenpox with an originally herpetic distribution. Although no source of infection was detected, and the coincidence is a very curious one, it seems not improbable that there was no real connection between the two attacks.

D. *Cases of Chickenpox and Herpes appearing simultaneously in different Individuals.*—Cranston Low reports that a patient in a ward of the Edinburgh Royal Infirmary developed a typical right-sided thoracic herpes zoster. Two days later a child in the same ward developed chickenpox. Both these patients had been in hospital for several weeks and it is suggested that the infection was introduced by visitors. Oakes, in 1913, reported that he saw two children in one household on the same day, one with typical shingles, the other with typical chickenpox. Gray has put on record a similar occurrence. Three brothers were admitted to hospital with scarlet fever. The eldest, who had no previous history of chickenpox, had well-marked right-sided herpes zoster, and had one or two spots on the left side of the chest which, on healing, left a scar suggestive of chickenpox. Four days later one of the brothers developed definite chickenpox, which the youngest child took from him after the usual incubation. Unfortunately it is not stated if the herpes had been long present before admission or had only just appeared, but, if the latter, the case falls into this group.

The theory of the identity of the virus of the two diseases, then, rests on such facts as have been collected above. There is, moreover, some evidence that herpes occasionally appears in epidemic form, that it is unusually prevalent, for instance, in a particular place at a particular time. Further, it has been reported as being epidemic along with an epidemic of chickenpox. Heim has recorded such an occurrence in Budapest in 1912.

Cranston Low, assuming the virus of the two diseases to be identical, has put forward the ingenious theory that in herpes the infection is local, through the nose and along the lymphatics round the olfactory nerves, as has been shown to be the case in anterior poliomyelitis, whereas in chickenpox there is a blood infection with the virus. In the combined cases the virus reaches the spinal ganglia first and a few days later invades the general circulation.

Difficulties in accepting the Identity Theory.—Admitting that it is difficult in the light of the above facts to exclude the possibility of a real relationship between the two conditions much yet remains to be explained. The question of immunity for instance, requires careful consideration. Many patients who suffer from herpes have previously had chickenpox, and there is no reason to believe that herpes protects against chickenpox. For instance, Savill mentions an instance of a boy developing herpes five months after an attack of chickenpox, and Dr Scotland's case, mentioned above, shows that chickenpox can follow closely upon herpes. Are we to assume that the general blood infection is not sufficient to make the individual immune to the local nerve infection? Moreover herpes does not protect against itself, second attacks being known to occur. Taylor, for example, has reported instances of second attacks. The same, however, might be said of almost any infectious disease. But, from another point of view, herpes does not behave as if it depended on a living virus. The frequency with which it has been reported to appear during a course of treatment with arsenic is very difficult to explain on any theory of infection. Le Feuvre seems inclined to brush this difficulty aside, and to cling to the possibility of infectious diseases arising *de novo*. Cranston Low suggests that second attacks of herpes are not in reality true herpes, but are due to the irritation of recurrent attacks of peripheral neuritis, and presumably he would explain the arsenic cases in the same manner.

Conclusions.—Looking at the subject as a whole, it appears to me that the small number of cases in the second group, that is to say chickenpox followed by herpes, may readily be explained by coincidence. Further instances of this sequence should certainly be reported before we can lay much stress on it. Secondly, the cases in the third group, the two conditions

co-existing, may be accounted for either by chickenpox starting for some unknown reason with a herpetic distribution or by the phenomenon known as "generalised herpes." The fourth group again, simultaneous attacks of herpes and chickenpox in different individuals, might well, from the small numbers reported so far, depend upon coincidence. The really difficult group to explain is the first. A large number of instances have been reported in which chickenpox has followed herpes, and always within the ordinary limits of the incubation period of the former disease. I do not think we can put this fact lightly aside. We probably all have a prejudice in favour of keeping what we consider different diseases in water-tight compartments, but that need not blind us to the fact that a careful investigation of the whole problem is necessary.

The key to the mystery lies, I am convinced, in the hands of the general practitioner. All cases in which any association of the two diseases is noticed should be carefully noted and put on record. What, I think, is equally important is to keep a note of all cases of herpes which, occurring in a family of susceptible children, are *not* followed by chickenpox. For instance, in the last few years, 7 cases of herpes have occurred in the Edinburgh City Hospital in wards in which there were one or more susceptible children. Three of these only have been followed by outbreaks of chickenpox, a proportion which appears to myself to be remarkably large. If such facts were put on record, however, we would soon learn what proportion of cases of herpes were followed by chickenpox, and if any considerable percentage were so followed the relationship between the diseases could, I think, be accepted. The proportions, moreover, of herpes patients who have or have not previously suffered from chickenpox would be an interesting addition to our knowledge. All that is required is a considerable number of practitioners, say one hundred, willing to note such facts for a period of say five years. Attention might also be given to the question of second attacks of herpes, and to the dates on which herpes cases occurred in the practices of the observers and his neighbours with a view to investigating epidemicity. If a few medical officers of health would persuade their municipalities to follow the example of Bulawayo which, no doubt at the instance of Dr Le Feuvre, has made both "shingles"

and "chickenpox" notifiable diseases, still more light would be thrown on the question. But until a considerable mass of information can be obtained we must, I fear, leave the question an open one, recognising at the same time that such information is necessary before we can, with any justice, repudiate the theory of identity.

Discussion.

Dr Goodall said he had been impressed by the great difference in the severity of cases of chickenpox and cases of herpes. He had never seen a really severe case of chickenpox, but he had seen very severe cases of herpes. If the conditions were related one would expect the toxæmic symptoms of chickenpox to be much more severe. In his opinion, if there was a relationship it was a relationship similar to that between boils and diabetes. The severity of the constitutional symptoms was a strong point in proving that the toxines were essentially different.

Dr Fowler thought that one point of great difficulty in discussing this question was the infectivity of chickenpox. He thought herpes was more likely to cause chickenpox than to follow it. He felt that everything was against the two conditions being connected. Many cases of chickenpox were seen in which no other source of infection could be found.

Dr Langwell wondered, if in cases where the two conditions were associated, had there been any pain, and had there been any nerve lesion associated with the chickenpox that had been previously associated with herpes.

Mr Chisholm asked whether the deep reflexes had helped in diagnosis of the difficult cases.

Dr Ker in reply agreed that herpes was generally more severe than chickenpox. He could not recollect a case of chickenpox in which there had been much pain of the herpetic type. He had not specially investigated the deep reflexes in either disease.

2. THE PROGNOSIS IN CERTAIN AFFECTIONS OF THE HEART

By W. T. RITCHIE, O.B.E., M.D., F.R.C.P.E.

To those who are suffering from affections of the heart, prognosis is of the utmost importance. The parents of the boy whose heart was strained ask whether he may safely indulge in any form of athletics at school; others wish to know whether the condition of the heart will debar their son from entering one of the services. The young man wonders whether the valvular heart disease for which he was invalided from the army is any bar to his intended marriage, or a Life Assurance Company may desire to know his expectation of life. The anxious wife's first question is—will her husband be spared; and he himself soon begins to enquire whether he can look forward to complete recovery, or whether he must needs relinquish all, or only some, of his former activities.

To the physician, prognosis is also an important problem, because the treatment he recommends is often based not only upon a correct interpretation of the patient's symptoms and physical signs, but also upon a reasonably accurate forecast of the degree of health to which the patient may be restored.

It may be said that prognosis in heart disease is notoriously speculative and uncertain, and it is true that many intercurrent factors may arise and upset our most careful estimate of the patient's future. Nevertheless, there are certain general principles which we recognise as of the utmost value in guiding us to the knowledge that whereas one patient will make a complete recovery, and another may look forward to some years of relatively good, though impaired, health, the life of another is fast drawing to a close.

Prognosis is primarily always dependent on accuracy of diagnosis. The precise data furnished by radiograms, the sphygmomanometer, the polygraph and the electro-cardiograph have placed diagnosis on a firm basis, and the co-relation of this knowledge with symptoms and physical signs has now become so well established that in practice we can usually dispense with the electro-cardiograph and other elaborate instrumental methods.

The prognosis in relation to cardiac affections is practically always more favourable if organic disease of the heart can be excluded. I do not hold with the theory which sought to minimise or to deny the unfavourable effect of organic valvular disease. That budding doctrine never took root in the cold, critical, conservative atmosphere of the north, and even in the sunny south the war killed it. Now, no one seriously believes that men with organic valvular disease are really first-class lives, or even that they are fit for military service in category A. It is true that some men with organic valvular disease are fit for a hard game of football or for strenuous physical work, but cases of this nature are exceptional. In the course of the acute endocarditis from which the patient suffered some years previously there were probably more focal inflammatory lesions in the myocardium than we suspected, and these must have left some permanent damage to the heart muscle. Consequently a chronic valvular lesion, apart from the mechanical disability it imposes upon the heart, thereby lowering its reserve force, is often associated with at least some degree of chronic myocarditis.

The prognosis, however, should never be founded solely on a study of the heart. We have to take into consideration the patient's age, sex, and occupation, the state of the arterial walls, the blood pressure, the efficiency of the kidneys, and the state of the pulmonary and other systems. Moreover, we have to remember that chronic degenerative changes, due to spirochætal infection, are slowly progressive, this being of particular importance in relation to aortic incompetence; whereas acute rheumatic lesions of the myocardium and endocardium are liable to recur, especially if the primary source of infection, whether it be in the tonsils or elsewhere, cannot be located and removed. Even after all the available data have been elicited and weighed, we are reminded of the fact that no two cases are exactly comparable, and that each individual case must be judged on its merits.

I do not propose to enter upon the consideration of the phenomena associated with the patient's response to physical exertion, though this is of the greatest value in determining the functional state of the heart muscle, and consequently in ascertaining, for example, whether there is some degree of

cardiac failure in addition to valvular disease. Nor shall I consider the symptoms and signs which collectively indicate pronounced cardiac failure, nor the prognostic significance of deficient renal activity in heart disease; but I shall limit my remarks to certain of the more common cardiac disorders which we encounter in the course of our daily work.

Let us first consider the prognosis in *dilatation of the heart.* I shall not deal with the dilatation which follows as a late and often terminal result of myocarditis, with or without valvular disease, but wish to speak of the cardiac dilatation which apparently ensues as a direct result of some unusual physical stress, or which is first recognised during, or in the early phase of convalescence from, an acute infective illness.

In regard to the former group of cases, namely those usually spoken of as *cardiac overstrain*, it may safely be affirmed that physical exertion never causes a pathological degree of dilatation in a perfectly healthy heart. The recognition of this fact renders it difficult, or impossible, to give a wholly favourable prognosis to a patient suffering from cardiac overstrain, although the immediate prognosis may be good. The patient has usually attained an age which makes it almost certain that arteriosclerosis has already begun, and we remember that age is a matter of tissue change, not merely of years. The case of a joiner, aged fifty-two, affords a good illustration. He was employed in a colliery, and enjoyed excellent health until he volunteered for the unaccustomed work of firing boilers during a miners' strike. Ten months later he was still breathless and fit for little work, the heart was preserving its normal rhythm, there was no dropsy, and no murmurs were audible, but the blood-pressure readings were high, the diastolic pressure being 85 and the systolic pressure 170, and after slight exertion the pulse-rate took four minutes to decline to its pre-exertion rate of 90. In such cases of cardiac overstrain, the patient must be content to live on a lower plane of activity than formerly. He must avoid calling upon the heart, the reserve force of which is lowered, for more work than it can successfully undertake; and any physical effort which occasions dyspnœa, pain, or precordial distress is harmful. The best advice to give to most of these patients is that which I learned from Cowan of Glasgow, namely, that an active or a merry life will mean a short one.

In cases of cardiac dilatation from acute infective disease, the chief difficulty centres in the question of diagnosis. The patient has passed through an acute febrile illness, often of rheumatic or influenzal nature, the heart has become slightly enlarged, the pulse-rate remains somewhat too frequent, and a systolic murmur has become audible. Has one of the valves been damaged by endocarditis, or is the heart merely dilated? It is principally when the systolic murmur is maximal at the cardiac apex that we have to consider the possibility of its being an indication of recent endocarditis which, even although the immediate prognosis be favourable, will leave the mitral valve permanently damaged and will probably cause grave incapacity in the course of years. My own experience has taught me that an apical systolic murmur is almost certainly due, not to organic mitral incompetence, but to dilatation, if the apex-beat is not displaced and not unduly forcible, if the murmur is soft in quality and confined to the apical region, if the intensity of the murmur varies notably with change of posture, and if the pulse retains its physiological, respiratory, irregularity. The conclusion thus arrived at is strengthened if the patient is anæmic and if there is a functional systolic murmur at the pulmonary, and possibly also at the tricuspid, area.

In these cases of cardiac dilatation the prospect of complete recovery is good. The murmur may persist for weeks or months, but ultimately disappears entirely. It is now a frequent experience to find the heart perfectly normal in men who, one, two, or three years ago, were invalided out of the army because they presented a mitral systolic murmur which had led to a diagnosis of V.D.H. We are now observing on a vast scale the phenomena to which George Balfour drew attention in his classic observations on "Curable Mitral Disease."

Passing to another common disorder, D.A.H., we recognise this as a symptom-complex, protean in origin, and by no means confined to those who have served in the army. When the man who was always a weakling, unfit to play games at school, and who found his true level in a quiet, sedentary, unambitious walk of life, attempts to undertake larger responsibilities, he becomes incapacitated by the giddiness, fatigue, palpitation, precordial pain and other symptoms characterising this disorder. We all recognise that this type of person will never become

robust. Those in whom the disorder has arisen as a sequel to shell concussion, or in civil life to some other form of trauma, may be expected to improve slowly if under judicious treatment.

After excluding these cases, and those in whom we find visceroptosis, obesity, arteriosclerosis, early pulmonary tuberculosis, hyperthyroidism, etc., we find, that in over 40 per cent. of all patients who are said to suffer from D.A.H., there is evidence of some recent infection, and in an additional 10 per cent. there is anæmia, which is presumably of toxic origin. In all these cases—50 per cent. of the total—the prognosis is, in my opinion, good. The disturbance may be essentially one of the endocrine glands or of the autonomic nervous system, but it is not the heart that is primarily at fault.

If we give a guarded prognosis, keep the patient confined to bed, permit the attention of devoted relations, administer digitalis, which is of no value to the patient, and exercise an anxious watchful supervision lest the patient overtax the heart; if we do this we confirm the patient in the belief that he is suffering from serious heart disease, and the condition progresses from bad to worse.

A good prognosis is the first essential in restoring the patient's confidence. He must be told he is not suffering from heart disease, that the heart is healthy, and that he will make a complete recovery. He should not be allowed to lie in bed; the less he is waited on and the more he does for himself the better, for the more he accomplishes the greater the degree of self-confidence he regains. During the first few days, massage and passive exercises are of value. When he first begins to walk about his tolerance of exercise is naturally poor, but he should be encouraged to undertake an increasing amount of physical exercise daily. Within a few days he should be performing active physical exercises under skilled supervision; he is then encouraged to take active exercise out of doors. Drugs are seldom indicated; digitalis is wholly useless.

This method of treatment seldom fails, and is usually speedily and eminently successful in restoring the patient to health. It was so in the army. Of nearly 2000 men under my supervision, 69 per cent. became fit for full duty in the front line; and in 1918 when our organisation for physical testing and training had reached its maximum efficiency, no less than

86·9 per cent. of A class men admitted to hospital for D.A.H. became fit to rejoin their units. Relapses very seldom occurred.

In civil life the prospects of full recovery are not so uniformly good. The patient does not lead so healthy a life as that of a soldier in the command depôt; he is now less amenable to control, physical training needing skilled supervision is costly and is not so efficient as it was in the army, there are devoted relations whose influence is the reverse of helpful, and in certain grades of the community there is the sure expectation that incapacity for work will be compensated by grants from public funds. Nevertheless brilliant results may be obtained even under the adverse conditions of civil life, and a man or woman who has been practically bed-ridden for months may, within a few weeks, be leading an active and useful life. The cases in which the dominant manifestations are those of neurasthenia are the most intractable and the most prone to relapse.

Passing to the most common of all forms of cardiac irregularity, namely *extrasystoles*, the prognosis should never be based on the extrasystoles alone, but rather on the underlying cause. If they are due to sympathetic stimulation of the heart under the influence of the emotions, or to obvious toxæmia from tobacco, and if the patients are otherwise healthy, a favourable prognosis may unhesitatingly be given. Extrasystoles are likewise not of serious significance if they arise even without definite cause in young adults in whom the heart is healthy and in whom there are no signs of cardiac failure. That the immediate prognosis in these cases is good is demonstrated by the fact that of thirty-four soldiers sent to the base, solely on account of extrasystoles, twenty-two were proved to be fit for category A, after a short stay in hospital and in a training centre. In civil life the conditions are equally favourable for recovery. I cannot recall a single instance of extrasystoles, arising in a young man or woman whose heart was otherwise normal, being the precursors of more grave heart affections. In illustration I refer to one patient who, at the age of forty-eight, was suffering from syphilis of the lung, the arteries were healthy and the heart, save for extrasystoles, was normal. Seven years later he was in rude health. In another, aged forty-one, extrasystoles were observed during a mild rheumatic attack. He made a complete recovery and enjoyed

good health for nine years, when the strain of carrying on his business during the war led to insomnia and other nervous symptoms, and in the course of examination a slight mitral leak was detected.

In patients over forty years of age, however, extrasystoles arising without obvious cause should be regarded with some suspicion, for they probably indicate commencing sclerosis of the coronary arteries. The extrasystoles are the first danger signals, and the man's expectation of life is not first class, although it may be several years before any further manifestations of arteriosclerosis can be elicited. In these cases the determination of the blood pressure is of particular value, for we know that arteriosclerosis is often the direct sequel to high blood pressure. In cases with any symptoms of cardiac failure a most careful examination of the pulse should be made in order to ascertain whether there is any alternation of the pulse after the extrasystoles. Even transient alternation, with alternate weak and strong beats, is always of evil omen, and I am in accord with those who find that these patients seldom survive for more than one or at most two years. In the aged, extrasystoles are not only frequent, but are usually attended with remarkably few symptoms, and with a relatively good prognosis.

Extrasystoles, arising in the ventricles, are, on the whole, attended with a better prognosis than those arising in the supra-ventricular portions of the heart, namely auricular and nodal extrasystoles. Whereas a man with ventricular extrasystoles and thickened arteries may continue at his work for some years before becoming seriously incapacitated; the heart of an individual with auricular or nodal extrasystoles has been failing before they were observed.

The isolated or single extrasystole is of lesser significance than multiple extrasystoles occurring in series and causing momentary attacks of palpitation or of tremor cordis, because multiple extrasystoles are not infrequently the forerunners of paroxysmal nodal tachycardia, of flutter, or of fibrillation.

Lastly, as to the prognosis of *auricular fibrillation*. When this begins we know that the last act has begun. How long will it be before the curtain finally falls? It may be within a few weeks, or it may be ten or more years. The prognosis

is generally more favourable in those with mitral disease than in those with arteriosclerosis and myocardial degeneration. Apart from this there are four great factors which influence the prognosis—(1) Those without much acceleration of the ventricular rate suffer least and survive longest, whereas a high ventricular rate is unfavourable. (2) The response of the heart to digitalis. Those in whom the ventricular rate is readily controlled by this drug or by strophanthus may for years lead quiet lives with little discomfort. (3) Those in whom the ventricles do not become dilated remain comparatively well, whereas in those who develop dropsy the prognosis is much more grave. The first attack of dropsy is seldom fatal, but it recurs from time to time, and on each occasion recovery becomes more tedious. (4) Finally, we may observe symptoms and signs of chronic nephritis, the cardiac patient has become a cardio-renal one, and we know the fatal issue is within measurable distance.

Discussion.

Dr Fleming was glad that Dr Ritchie emphasised the importance of massage and exercises as being of very great value in putting right a dilated heart. He thoroughly agreed with this. This condition was not always a result of a definite cardiac lesion, though there might be a lesion at the base of the disease. In connection with the systolic murmur at the mitral area he wondered if this murmur was not really in some cases simply a functional murmur.

Dr Bramwell thought that a very important point was the fact that a definite opinion as to the diagnosis ought to be given by a physician in every case of this kind. In his experience more heart disorders were created during the war than improved, just because a physician expressed uncertain opinions, thus doing very great harm to the patient. A definite opinion must be given, and the patient told he is going to get better, if the results are to be successful. He referred to 2 cases which had rather proved exceptions. *One* was a man aged fifty-six who consulted him about some other condition altogether. Some time before the patient had had aortic disease and had consulted a physician in London. He had been told he must

lead a very quiet life and give up his work, etc. Twenty-six years later the patient had had no symptoms, though he had lived his ordinary life in every way—going to work every day, etc. He died aged sixty-six from cardiac symptoms. *The second case* was of a boy aged fourteen who had been told he must not play games, etc., as he had a weak heart. While on holiday, however, he had done a great deal of deer stalking, etc., for days at a time and had felt very fit indeed at the end, in spite of all the exertion. A physician must be definite in his prognosis otherwise a patient's whole life might be spoilt.

Dr Ritchie in reply said that the systolic murmur was often functional. There was no absolute method of quickly determining the functional capacity of the heart.

3. THE USE OF CONCAVE GLASSES FOR NEAR WORK IN LOW DEGREES OF MYOPIA

By H. M. TRAQUAIR, M.D., F.R.C.S., Assistant Ophthalmic Surgeon, Royal Infirmary, Edinburgh.

As a general rule, most short-sighted individuals, even when young, whose myopia is low or moderate in degree, prefer to read and do close work without correcting lenses, only using the latter to improve distant vision. It is also characteristic of myopes that they are often not averse to a certain amount of indistinctness in distant vision, many prefer it, especially if they have been accustomed to an under-correction or have never worn glasses. Where the myopia is moderately high, the patient may complain of bad distant vision and of discomfort in near work, owing to the necessity of approaching his face very closely to the objects he desires to see clearly. On the other hand, when the myopia is low, near objects are easily focussed at a comfortable distance, and it is nearly always solely to obtain improvement in distant vision that the aid of glasses is sought.

It is therefore of interest to find that some short-sighted persons, who have only a low degree of myopia, complain of near vision only, and find that they cannot do near work in comfort without wearing a full correction.

The first case which drew my attention to this condition was that of a young engineer draughtsman, about twenty-three years of age, who had been ordered spherical concave lenses of about 2 or 3 diopters for his myopia by an optician who advised him not to use them for near work. He complained that he had to work with his face so close to his drawing-board that he could hardly carry on. His myopia was obviously too low to necessitate this, and he was evidently using an excessive amount of accommodation and of convergence in addition. The explanation appears to be, that the desire for clear vision at a comfortable distance stimulated his convergence mechanism, which stimulated his accommodation, thus establishing a vicious circle which kept him always relatively myopic until the limit of his endurance was reached. Advice to use his glasses for near work remedied matters at once.

This patient's sister has a considerably lower degree of myopia, and got irritation of the eyelids and conjunctiva on reading or sewing. There was no complaint in regard to distant vision. A full correction for near work completely relieved the symptoms, but, as a very slight degree of astigmatism was present, the case is not included in the present series.

Subsequently notes were taken of cases of low myopia without astigmatism and without anisometropia of more than a quarter of a diopter in which near vision only was complained of. With these restrictions only a few cases could be collected, and the following notes refer to eleven cases of this kind, all of which reported later as to the effects of the glasses ordered. Had cases been included in which there was low astigmatism or anisometropia, or in which the patient complained of distant vision also, a much larger number might have been reviewed.

It will be sufficient to present here an analysis of the cases without going into detail with regard to each.

Sex.—Eight were females and three males.

Age.—The average age was 20·6 years, the extremes being eight and thirty.

Occupation.—There were two dressmakers and two clerkesses, one housewife, student, schoolgirl, compositor, and bookfolder. In two the occupation was not noted. They were probably all persons who used their eyes for near work a good deal.

Myopia.—The average myopia in the twenty-two eyes was 0·95 diopter; the lowest was 0·25 diopter in each eye, the highest 2·0 diopters in each eye. In no case was there any astigmatism or a difference of more than a quarter of a diopter between the two eyes. No latent squint or anomaly in the associated movements of the eyes was disclosed by ordinary methods of examination.

Complaint.—Eight complained of pains in the back of the eyes and in the head when reading, one of these had "misty" vision when reading. Two said that the eyes became sore when reading, and one that the eyes became "bloodshot" after sewing. Thus whether headache was present or not they all complained of discomfort in the eyes on doing near work. None complained of poor vision for distance, though after having worn a full-correction and discovered what distant vision should be, several noticed that their distant vision was bad without their glasses.

Treatment and Results.—Only one—the youngest, aged eight—was tested under atropin, the result, 0·5 diopter, being the same as had been found without atropin. All were ordered a full-correction for all purposes. All were relieved of their symptoms, mostly very rapidly. Two found that the discomfort on near work disappeared after wearing the glasses for general purposes through the day, though not for reading at night. Two found the glasses specially useful for reading, and one of these only uses the glasses for near work. These two had very low degrees of myopia, one, a student, with 0·25 diopter in each eye; the other, a tailoress, with 0·5 diopter in the right eye and 0·75 diopter in the left.

Special reference may be made to two of the cases. One was that of the student, with only a quarter of a diopter of myopia in each eye, who wrote in reply to my enquiry: "I may say that the glasses help me very much in reading." As to whether this fortunate result was obtained by physical or by psychical means I am not prepared to be positive, the fact remains that these weak concave lenses enabled him to study with comfort for several hours at a time. Another case is that of a bookfolder, aged twenty-seven, who had anæmia, vertical headaches, and "misty" vision on reading. At first sight one would be inclined to think that the misty vision

resulted from impairment of accommodation owing to the anæmia, and that the headaches were due to the attempt to maintain accommodation and to the anæmia. It is quite probable that the headaches were, in part at any rate, directly due to the anæmia. This is just the type of case in which convex glasses usually give relief by assisting accommodation. Here, however, one diopter of myopia was present in the right eye, and three-quarters of a diopter in the left. A full correction was given for all purposes and the headaches were relieved. Subsequently the glasses were used only for distant vision. I questioned the patient closely as to the effect of the glasses on the "misty vision" when reading during the period of headaches, and was assured that they had been of great benefit. Thus, under conditions which might reasonably be expected to lead to a reduction in accommodative power, relief was obtained by increasing the call upon accommodation. Another case which may be mentioned, though not included, in this series as the myopia was moderate in amount rather than low, was that of a schoolgirl of ten years with 4·5 diopters of myopia in each eye. She was wearing glasses of only 2·5 diopters, an under-correction which considerably reduced her distant vision. This, however, was not complained of, but advice was sought on account of pain in the eyes at night when preparing lessons. A full correction for near work relieved the symptoms. Four years later the same symptoms recurred and the myopia was found to have increased by 1·5 diopters to 6 diopters in each eye. The same treatment gave relief again.

I have also noted cases of low compound myoptic astigmatism with difficulty in near work relieved by an increase in the strength of the spherical lens only.

While these features in connection with myopia are not unknown to many ophthalmic surgeons, it is still stated in authentic text-books, that myopia of less than two diopters does not need correction except for distant vision, or in young children with a view to preventing its increase. Into the latter question it is unnecessary to enter here, but it may be pointed out that the cases noted required correction solely on account of discomfort on near work, that the average age was twenty years, and the average amount of myopia less than one diopter.

While the symptoms closely resembled those complained of by hypermetropes, they were evidently not caused by overaction of the ciliary muscles, or at least not primarily by this cause, but rather by the necessity for convergence without accommodation or with reduced accommodation. It is evident that in certain individuals with quite low myopia even a very slight relative over-convergence may cause the symptoms usually referred to as eye-strain. These cases also indicate that the principle of full-correction for near work in young myopes should always be aimed at, and that the danger of over-correction of myopia in young persons by examination without atropin is not great.

Discussion.

Dr Bramwell wondered what ophthalmic surgeons did in cases where patients were recovering from some illness and were troubled by their eyes during convalescence. Were glasses prescribed temporarily?

Dr Fleming had myopia himself and his glasses did not quite correct his vision. He wondered if the strain might make his eyes worse. He referred to the case of a man on duty at Court, who, when he first held office, had been told he would probably faint during the Presentation Ceremony. The reason for this would be the continual strain caused by people passing in front of his eyes before the Throne. After one and a half hours he felt very queer, and had to shut his eyes for a moment or two. This made him feel better, but the faint feeling returned again later. Dr Fleming wondered if that condition of fatigue would be more marked in a person who was slightly myopic.

4. NOTES ON BLACKWATER FEVER

By ALEXANDER GOODALL, M.D., F.R.C.P.E., Lecturer on Clinical Medicine in the University, and Assistant Physician to the Royal Infirmary, Edinburgh.

DURING my service as Officer in charge of a medical division in Macedonia I saw a large number of cases of blackwater fever. Some of the chief points in 14 of these cases are tabulated :—

	Previous Malaria.	Malaria Parasites.	Quinine Treatment.	Result.
1. Serb	+	+	V*	Recovered.
2. Serb	+	+	V	,,
3. Serb	+	+	V	,,
4. Serb	+	+	M	Died.
5. Greek	?	+	V	,,
6. Serb	+	O	V	Recovered.
7. Serb	+	O	V	,,
8. Serb	+	+	M	,,
9. Serb	O	+	V	,,
10. Serb	?	+	V	,,
11. Sgt. G.	+	+	OM	,,
12. Miss L.	O	+	V	,,
13. Pte. R.	O	+	O	,,
14. Serb	+	+	M	,,

* O, oral. M, intramuscular. V, intravenous.

It may be noted that 9 of the 14 cases had previous malaria, 3 had not, while in 2 cases the point could not be ascertained.

Case 12 arrived from England at the end of August. She had not had malaria and had not taken quinine. She began to suffer from blackwater fever on 10th October.

In 12 of the 14 cases, malaria parasites were found. They were all of the malignant tertian type. Case 13 is interesting in this respect. Very numerous young malignant rings were present in the blood at 11.30 A.M. and blackwater began at 3 P.M. the same day.

The cases were of all degrees of severity. In the majority there was only one attack which lasted for two days and then the urine became clear. A few of the cases had a second attack. Case 11 had three attacks and had a desperate struggle for life each time.

The temperature was only slightly raised in all the cases. They all showed jaundice, and albuminuria usually persisted for a few days after the hæmaturia.

Notes on the two Fatal Cases.

Case 4.—Serb, æt. 46, admitted to hospital on 5th September 1918 complaining of headache, pains, and cough. He had been ill for four days. Temperature 97. He had suffered from malaria in 1917. He was jaundiced, anæmic and appeared to suffer from profound toxæmia. He passed urine in bed and it was not till the 10th that a sample was obtained. This contained hæmoglobin, broken-down red corpuscles, epithelial cells, and blood and epithelial casts. He was treated with intramuscular injections of quinine but signs of pneumonia supervened. The spleen became palpable, vomiting became severe and death occurred on 12th September.

The temperature had never reached 99.

A post-mortem examination showed a flabby, dilated and fatty heart with blood stained endocardium and some recent vegetations on the mitral cusps. The lungs were œdematous. The right lower lobe showed red and gray hepatisation. The liver was enlarged and fatty. The gall bladder was distended. The spleen was three times its normal size. There was an increase of fibrous tissue with soft pulp and obscure Malpighian bodies. The kidneys were enlarged with cortex and papillæ swollen and congested. The pancreas was hard and fibrous. The alimentary canal showed nothing noteworthy.

On microscopic examination the liver showed a moderate degree of fatty degeneration. There was a golden coloured pigment in many of the liver cells and part of this gave the free iron reaction.

The spleen contained pigment in leucocytes and endothelial cells and also free. The kidneys showed some pigment, probably malarial, in some of the glomerular capillaries. The tubules were catarrhal and contained much broken down material evidently consisting of partially disintegrated red corpuscles. There were also numerous casts. The broken-down material was most abundant in the collecting tubules. The bone marrow was myelocytic but showed no great change.

The heart muscle was atrophic. There were a few hæmorrhages between the fibres. The right lung showed croupous pneumonia.

CASE 5.—Greek, admitted on 25th September 1918 after four days' journey. He was anæmic and yellow and passed blood-stained urine in bed. The spleen was enlarged, the lungs seemed healthy but the heart was dilated and the pulse was almost imperceptible.

He received an intramuscular injection of quinine bi-hydrochloride, 20 grains at 2 P.M., and as the pulse had improved, he received an intravenous injection of 20 grains at 6 P.M. This was repeated the next day in a pint of saline solution. Malignant tertian parasites were found in the blood. He died at 2.50 P.M. The temperature had never exceeded 99 F.

A *sectio* showed a dilated heart with flabby muscle. Lungs were congested. Liver pale and fatty, gall bladder distended. The spleen was six times the normal size. The kidneys were dark in colour.

Microscopic examination of the liver showed extreme fatty degeneration. Every here and there were necrotic areas. The cells contained much brown pigment and a small portion of this gave the free iron reaction. The spleen showed fibrosis and great masses of brown pigment in endothelial cells and large leucocytes. The kidneys showed catarrh of the convoluted tubules. There were blood corpuscles and detritus in the collecting tubes and ascending limbs of Henle's loops—most in the former. The bone marrow was myelocytic. The giant cells were numerous and appeared healthy. The heart muscle was extremely atrophic with exudation between the fibres.

I wish to submit that these cases strongly support the view that blackwater fever is a manifestation of malaria, and that the onset of the hæmaturia or hæmoglobinuria may be determined by exposure to cold. The majority of my Serb patients had taken part in the attack that led to the Bulgar capitulation, and cold and privation had been suffered by all the cases.

Tropical hæmoglobinuria or hæmaturia is commonly recognised in three forms—(1) Malarial hæmaturia, (2) Quinine hæmoglobinuria, (3) Blackwater fever.

1. Malarial hæmaturia is characterised by the presence of malarial parasites and the absence of jaundice. In an experience of some 20,000 cases of malaria[1] I have only seen

one example, and I regard the condition as due to a localisation of parasites in the urinary passages or a local lesion resulting from the parasite or its toxins and comparable to malarial appendicitis, pneumonia or keratitis.

2. Quinine hæmoglobinuria is widely recognised but I have never met with it in spite of the fact that all my malaria cases never received less than 30 grains of quinine daily for many successive days, and I have given as much as 60 grains intravenously within an hour.

The arguments adduced against the malarial origin of blackwater fever are the following :—

(1) The rarity of blackwater fever in places where severe malaria is prevalent. This seems to me a doubtful proposition. The incidence of blackwater is often transient, and I agree with Parsons and Forbes[2] that it is often over-looked.

(2) The seasonal incidence of blackwater fever differed from that of malaria in Macedonia, blackwater being most common in the winter months. I think that this may be accounted for by the factor of exposure to cold.

(3) It is frequently stated that quinine administration often causes blackwater fever and that blackwater fever is not benefited by quinine. I am prepared to controvert both statements. Of course, blackwater fever may follow the administration of quinine if the dosage is inadequate or if a sufficient number of corpuscles has been affected before it is given. I have administered quinine intravenously in large doses in blackwater fever at every stage and have never seen harm follow, and latterly intravenous quinine in saline was my routine treatment. In that practice I was by no means alone.[3]

(4) It is frequently stated that malaria parasites are rarely found in blackwater fever. This is contrary to my experience.

Noël Paton[4] and I pointed out in 1903 that hæmolytic agents fall into two groups—(1) True hæmolytics, such as glycerine and distilled water, dissolve out hæmoglobin which is set free in the plasma and appears in the Bowman's capsules in the kidneys; (2) toxic agents, such as toluylen-diamine and phenyl-hydrazin, poison the corpuscles but do not liberate hæmoglobin. Very large doses of phenyl-hydrazin kill animals with the formation of a brown pigment in the blood resembling, but not identical with, methæmoglobin and with hæmaturia.

Hæmoglobin does not appear in the Bowman's capsules but blood pigment appears in the urinary tubules and in their epithelium. In smaller doses there is no hæmaturia but pigmentary changes occur in the liver, spleen, and kidneys.

Now, the distribution of damaged blood corpuscles and pigment appears to be identical in blackwater fever with that found in animals poisoned with the second class of hæmolytics. Blackwater fever is therefore regarded as due to destruction of blood corpuscles by the malarial parasite. The parasites associated with blackwater fever are the malignant type which does most damage to the corpuscles, has the greatest tendency to cause local symptoms, and sporulates and liberates toxins mainly in the internal organs. A moderate amount of damage may lead to jaundice only. A greater destruction of red corpuscles may be more than the usual hæmolytic organs can deal with, and blackwater fever results. The influence of cold is, I think, an important causal factor. W. Hunter[5] showed that normal animals became more deeply jaundiced than spleenless animals after poisoning with the second class of hæmolytics. Paton[4] and I confirmed this observation, and concluded that the greater jaundice in the normal animals was simply due to a more rapid fixing of the poisoned corpuscles in the portal system.

One does not overlook the important influence that cold has been shown to exert in determining an attack of paroxysmal hæmoglobinuria, but it is unnecessary, I think, to invoke immunity reactions to explain its influence in blackwater fever. Cold may be regarded as acting much in the same way as the spleen does in the experimental animals, by retaining a larger proportion of corpuscles in the internal organs and thereby exposing them to a larger contact with the hæmolytic organs. Such a view might afford a simple explanation of apparent anomalies in the incidence of blackwater fever, both as regards time and place.

Summary.

Fourteen cases are tabulated. In 12 of these, malaria parasites were found. All the cases were treated with large doses of quinine and 12 recovered. It is contended that

malaria is the essential cause of blackwater fever, and that exposure to cold may be an important factor in determining its onset.

REFERENCES.—[1] Goodall, *Edin. Med. Journ.*, March 1919. [2] Parsons and Forbes, *Lancet*, 7th September 1918. [3] Alport, "Malaria and its Treatment," 1919. [4] Noël Paton and Goodall, *Journ. of Physiol.* xxix., 1903. [5] Hunter, *Lancet*, ii., 1892.

DISCUSSION.

Dr Fleming had seen very few cases of blackwater fever. He thought quinine was a very valuable curative in the disease, but must be given in large doses if it was to do any good. He regarded cold an important factor to be taken into consideration, as a cause, but did not quite agree that it was the determining agent of an attack. In Macedonia he said there were 70 per cent. or 80 per cent. of cases of malignant malaria, and only very few cases of blackwater fever. It was difficult to find a reason for this.

Dr Marshall thought that cold was a great factor in producing malaria, and he wondered if blackwater fever was not just a type of malaria. That quinine was the cause of the fever was the opinion held by most people in East Africa and other places where he had been for some time, and he had had great difficulty in giving patients satisfactory quinine treatment. Every case of fever had been exposed to malaria over and over again. He had seen cases where the malaria organism had been present in the blood, and yet the patient had not developed the disease. In some places he had seen very many cases of malaria and none of blackwater fever. The fever he thought might be regarded as a type of pernicious malaria. During the war the soldiers suffered very much from cold in the camps, and he had seen many cases of malaria but very few of blackwater fever. He gave each case at least 30 grains of quinine and in a few cases an intravenous injection of quinine was given. Great care must be taken as to how the quinine was given and was continued. In his opinion quinine was most certainly not a cause of blackwater fever, but the correct treatment.

Dr Ritchie had never seen a fatal case of the fever. He did not think cold was the only exciting cause of the disease but perhaps just an accidental one. There must be some other cause as well. He thought that cases should always be treated with quinine, which he regarded as almost specific in treatment. We must not rely too much on what was written before the war on the subject of treatment. Our experience of the disease had increased enormously in the past few years.

Dr Traquair did not think that quinine was any more the cause of blackwater fever than it was the cause of any other disease in which it was used in treatment.

Dr Goodall in reply stated that cold was not the only factor in determining the attack, but it was a very important one, and present in all of his cases.

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